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THESIS

MODIFICATION OF THE F-14: A CASE STUDY
IN DECISIONS AFFECTING A MAJOR
SYSTEMS UPGRADE

by

Perry J. Delahoussaye

March 1994

Principal Advisor: Walter E. Owen
Associate Advisor: Sterling Sessions

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In 1984, the first major system upgrade to the Grumman F-14 began. Despite meeting all acquisition milestones and being within budget, the program was terminated by the Department of Defense in 1991. This cancellation was not only controversial within the Naval community, but more importantly, indicated a major shift in criteria used by decision makers to evaluate program success. This thesis examines the decision-making process surrounding the Government's decision to modify and later cancel the F-14 upgrade. Research indicates that as the defense budget shrinks, acquisition program formulation and execution becomes much larger than the manipulation of cost, schedule, and performance. The Service must define, defend, and execute its acquisition strategies to address the political concerns of the U.S. Congress, Industry, and the Office of the Secretary of Defense. Lessons learned from the F-14 upgrade will help future Program Managers understand shifting organizational and political dynamics within the system acquisition process.

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Modification of the F-14: A Case Study In Decisions Affecting a Major Systems Upgrade

by

Perry J. Delahoussaye
Major, United States Army
B.S., United States Military Academy, 1981

Submitted in partial fulfillment
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Author: [redacted]
Perry J. Delahoussaye

Approved by: [redacted]
Walter E. Owen, Principal Advisor

[redacted]
Sterling Sessions, Associate Advisor

[redacted]
David R. Whipple, Chairman,
Department of Systems Management

ABSTRACT

In 1984, the first major system upgrade to the Grumman F-14 began. Despite meeting all major acquisition milestones and being within budget, the program was terminated by the Department of Defense in 1991. This cancellation was not only controversial within the Naval community, but more importantly, indicated a major shift in the criteria used by decision makers to evaluate program success. This thesis examines the decision-making process surrounding the Government's decision to modify and later cancel the F-14 upgrade. Research indicates that as the defense budget shrinks, acquisition program formulation and execution becomes much larger than the manipulation of cost, schedule, and performance. The Service must define, defend, and execute its acquisition strategies to address the political concerns of the U.S. Congress, Industry, and the Office of the Secretary of Defense. Lessons learned from the F-14 upgrade will help future Program Mangers understand shifting organizational and political dynamics within the system acquisition process.

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I. INTRODUCTION

A. GENERAL COMMENTS

Department of Defense system acquisition management is a lengthy and intricate process involving substantial technical difficulties and political uncertainties. In his thesis " The F-14 Contract: A Case Study in Major Weapon System Acquisition and Program Management", Jon McIver discussed the genesis of the Grumman F-14 program and the problems involved with contract formulation. As a follow-on project, this thesis examines the modernization of the F-14 from a system acquisition management perspective.

Most defense systems undergo modification throughout their life cycle. A typical tactical aircraft, for example, undergoes four to five major modifications after deployment [Ref. 1:p. 16-1]. Systems are modified for three primary reasons: to increase system performance with new technology; to counter emerging enemy threats; and to correct system deficiencies discovered during operational performance. The underlying theme with all upgrades is that they extend the system's life and offer a cost-effective alternative to new weapon procurement.

In many respects, the strategic planning for a modification is similar to new system development. Due to the

complex nature and high cost of modern weapons, key decision makers draft strategies and build coalitions to achieve their goals. From an organizational and political perspective, there are three key participants in defense acquisition: the Executive Branch of the Federal Government, which formulates, directs, and executes national security policy; the Legislative Branch, which authorizes and funds defense programs; and Industry, which designs and produces the defense system.

B. OBJECTIVE OF THE RESEARCH

The reduction of available government resources has left both the Executive and Legislative Branches of Government with fewer options to meet the security needs of the nation. As the defense budget continues to shrink, Program Managers will need to understand the dynamics involved with defense policy formulation and implementation. With this basis, the objective of this research is to perform a comprehensive historical study of the F-14 upgrade program from 1974 to 1992. This thesis will examine and analyze the political and organizational processes involved with defense policy formulation and implementation. The conclusions drawn from the F-14 upgrade program will help future Program Managers understand the interaction of departmental services, Office of the Secretary of Defense and the U.S. Congress and their impact on weapon system acquisition. Armed with this

knowledge, the Program Manager will be in a stronger position to define, defend, and execute his acquisition program in a manner which addresses the concerns of key decision makers.

C. SCOPE

This thesis is a case study of the F-14 upgrade program. The study focuses on the decisions made by the Department of the Navy, Office of the Secretary of Defense, and the U.S. Congress from program inception until program termination.

D. RESEARCH QUESTIONS

1. Primary Research Question

What organizational and political factors were involved in the decision to modify the F-14 and what can Program Managers learn from the success and failure of this major program upgrade?

2. Subsidiary Research Questions

a. How does Congress influence the formulation and implementation of national defense policy?

b. How do Department of Defense Acquisition Managers market programs to Congress?

c. How does the Department of Defense manage major weapon system modification programs?

d. What factors in the acquisition process significantly affect cost, schedule and performance?

e. What were the major modifications to the F-14 and how did the Department of the Navy manage this upgrade?

f. What conclusions can the Navy draw from the F-14 upgrade program?

g. Who were the major players in the decision to terminate the F-14D? What organizational and political factors were involved in this decision?

E. METHODOLOGY

The information used in this thesis was obtained by several methods. A search of current and past literature was performed from Department of Defense Directives and Instructions, as well as, Reports from the Office of the Secretary of Defense(OSD), Congressional Budget Office (CBO) and General Accounting Office (GAO). Archival data was collected through Defense Logistics Studies Information Exchange (DLSIE) computer literature search, Defense Technical Information Center (DTIC) and other library sources at the Naval Postgraduate School. Historical F-14D program documents such as the acquisition strategy, operational requirements document, reports to Congress and congressional correspondence were extensively used.

F. THESIS ORGANIZATION

This thesis is organized in the following manner:

Chapter I provides general comments, thesis objectives, research questions, scope and assumptions, methodology, and organization of the study.

Chapter II outlines the procedures used by Congress to control weapon system acquisition. It includes a discussion on budget formulation and implementation and congressional oversight of the acquisition process.

Chapter III examines the Executive Branch of Government and its role in the defense acquisition process. The functions of the Defense Acquisition Board (DAB), Planning, Programming, and Budgeting System (PPBS), and program management design are discussed to establish a firm foundation for analyzing the F-14 upgrade program.

Chapter IV examines the genesis of the F-14 upgrade program to include requirements generation, acquisition strategy, and program management. Events which led to the termination of the F-14D will be analyzed. The impact of the F/A-18 program, the shifting political environment, and intra-organizational differences within DoD will be discussed.

Chapter V analyzes the decision-making process involved in the F-14 upgrade program through the use of Allison's Bureaucratic Politics Model. Conclusions concerning the research are presented.

Appendix A is a case study for use in the Acquisition and Contracting Curriculum at the Naval Postgraduate School.

Appendix B contains questions that a case study facilitator can use in the classroom to lead a successful discussion.

II. THE LEGISLATIVE BRANCH

A. INTRODUCTION

To understand the dynamics behind policy formulation and implementation, it is necessary to understand the environment in which decisions are made. The environment in which defense acquisition occurs is shaped, in large measure, by the roles, objectives, and perspectives of its major participants. This chapter familiarizes the reader with one of the key players, the U.S. Congress, and its role in the defense acquisition process. For purposes of this study, the Legislative Branch (the Congress) includes the "Defense Committees": the Senate and House Armed Services Committees and the Defense Subcommittees of the Senate and House Appropriation Committees; the Senate and House Budget Committees; other committees having legislative oversight of defense activities; individual members of Congress; the Congressional Budget Office and the General Accounting Office.

B. THE CONGRESSIONAL STRUCTURE

The Legislative Branch of Government conducts the preponderance of its work through the committee system. The major committees responsible for legislation pertaining to the defense budget are the Budget Committees, the Armed Services Committees, and the Appropriation Committees.

1. Budget Committees

The primary responsibility of the Budget Committee is to formulate the congressional budget plan. This budget plan, called the Budget Resolution, indicates Congress' overall spending priorities. Once adopted by the full Congress, the Budget Resolution establishes congressional fiscal policy for the upcoming year.

2. Authorization Committees

The Armed Services Committee of both chambers of Congress is responsible for creating and modifying programs relating to the common defense of the United States. The Senate Armed Services Committee (SASC) derives its authority and power from Senate Standing Rule XXV which provides that "all proposed legislation, messages, petitions, as well as matters relating to the common defense, the Department of Defense, and its subordinate departments...and other national defense issues, shall be referred to the SASC." [Ref. 2:p. 19] The House Armed Services Committee (HASC) is given similar power and authority by Standing Rule X of the House, with the exception of the appointment review privilege. [Ref. 3:pp. 350-351].

3. Appropriation Committees

The Appropriations Committee of both the House and Senate is responsible for allocating funds to authorized programs. The Senate Appropriations Committee (SAC) also

derives its authority and power from Senate Standing Rule XXV. Additionally, Senate Standing Rule XVI further prohibits appropriation of funds to programs which were not previously authorized. The rules for the House Appropriation Committee (HAC) are similar to the Senate. [Ref. 2:pp. 11-12]

C. BUDGET CONTROL

The Constitution of the United States gives Congress the power to allocate the resources of the Federal Government. This power gives Congress the authority to enact as well as oversee budget execution. Specifically:

> The Congress shall have power to lay and collect taxes, duties, imposts and excises, to pay the debt and provide for the common defence and general welfare of the United States...to raise and support armies...to provide and maintain a Navy...to make rules for the government and regulation of the land and naval forces...to provide for organizing, arming and disciplining the Militia, and for governing such part of them as may be employed in the Service of the United States. [Ref. 4:pp. 931-932]

Budgeting goes beyond the allocation of money to federal programs and agencies. Congressional budget expert Allen Schick sees budgeting as a political process used by the Government to formulate policy, establish and pursue national objectives, promote favorable economic conditions, and respond to the demand of citizens and groups [Ref. 5:p. 1]. A similar view is also held by public policy researcher Aaron Wildavsky who believes the budget serves as a mechanism for making choices, a statement of goals, and a contract between

Congress and the Executive to spend appropriated monies for authorized purposes [Ref. 6:pp. 1-3]. The power of Congress to tax and spend allows it to determine policy in many areas, make decisions, and control programs. The power over funding also gives Congress the ability to exert influence and control over the Department of Defense (DoD) during all phases of the military acquisition process. Joseph P. Harris, in his study, Congressional Control of Administration, summarized the purpose for congressional control over the DoD budget as follows:

> 1. To determine whether legislative policies are being faithfully, effectively and efficiently carried out in accordance with congressional intent, and to ensure that subsequent legislative action may be taken if necessary to amend shortcomings of DoD administration of congressional directives.
> 2. To determine whether legislative programs applicable to the DoD are achieving their desired goals and objectives, and if any additional legislation is required.
> 3. To determine if congressional directives are being faithfully administered in the public interest, and to encourage DoD officials to be diligent in this regard.
> 4. To discover instances of fraud, waste, and abuse by DoD personnel.
> 5. To ensure that management control systems within the DoD are adequate and effectively employed.
> 6. To hold DoD officials accountable to the Congress for the use of public funds and other resources available for their disposal. [Ref. 7:pp. 1-2]

Congress exercises budgetary control over DoD through statutory controls written into the authorization and appropriation acts and non-statutory controls such as committee reports, floor debates, hearings, and testimony.

D. AUTHORIZATION AND APPROPRIATION

The annual defense authorization and appropriation process remains the primary means for members of Congress to exert control over the DoD budget [Ref. 8:p. 64]. Defense authorization and appropriation bills are statutory in nature. Statutory legislation has the binding authority of law and cannot be modified by DoD. The means by which Congress provides defense funding is commonly called the "two-step" process [Ref. 9:pp. 60-61]. The first step, authorization, must be passed creating or modifying a program. The second step, appropriation, provides funds for the program.

1. Authorization Acts

> An authorization act is substantive legislation enacted by Congress that sets up or continues legal operation of a federal program or agency either indefinitely or for a specific period of time or sanctions a particular type of obligation or expenditure within a program. Authorizing legislation is usually a prerequisite for subsequent appropriations or other kinds of budget authority to be contained in appropriation acts. Such legislation may limit the amount of budget authority to be provided subsequently or may authorize the appropriation of such sums as may be necessary. [Ref. 6:p. 440]

2. Appropriation Acts

> An appropriation is an act of Congress that permits agencies to incur obligations and to make payments out of the Treasury for specified purposes. An appropriation act is a statute that provides for funds for federal programs. An appropriation act generally follows enactment of authorizing legislation unless the authorizing legislation itself provides the budget authority. [Ref.6:p.440]

The Armed Services Committees of Congress are responsible for authorizing programs and setting funding ceilings for programs. Public law prohibits the appropriation of defense funds which have not been authorized by the Armed Services Committees. Legislation also prohibits expenditure of funds in excess of the ceiling in the authorization bill. [Ref. 9:pp. 60-61]

In Mission Financing to Realign National Defense, Lawrence R. Jones, of the Naval Postgraduate School, argues that Congress shapes defense policy through the authorization and appropriation process. Jones states that "the authorization process enables Congress to oversee programs and to legislate policy." [Ref. 10:p. 46] Authorization procedures which have evolved for defense related items supports his assertion. Practically all DoD programs are subjected to annual review to establish authority prior to consideration in the appropriation process. According to James Lindsay, author of several articles on Congress and the defense budget, the Armed Services Committees have supported the annual authorization process "to reduce the area of discretionary power of the Office of the Secretary of Defense...and to strengthen legislative control over programs." [Ref. 11:p. 120] Lindsay argues:

> The [Armed Services Committees] traditionally have been skeptical of OSD, instead favoring the views of the individual services. By extending annual... authorizations, the Armed Services Committees have been

> able to keep OSD under close scrutiny and also have been provided opportunities to solicit the advice of the professional military. [Ref. 11:p. 376]

The yearly process of authorizing DoD's programs not only exerts congressional influence in defense policy formulation and implementation but also allows an individual member to draft legislation which benefits his constituents.

While the Armed Services Committees establish programs and authorize expenditures in support of those programs, the Appropriation Committees in the House and the Senate provide the funds to incur obligations. The procedure for providing funds is relatively straightforward. To obtain funds for authorized programs, an appropriation bill must be passed by both Houses of Congress. Appropriated funds cannot exceed the authorized ceiling for a program nor can unauthorized programs receive funding.

Jones believes the appropriation process is the single most important mechanism for control of the DoD budget because it allows Congress to supervise DoD management and financial operations and to actively participate in spending decisions [Ref. 10:p. 46]. Even though the appropriation procedure is straightforward, politics greatly complicate the process. Appropriation Committees generally concern themselves with more than a simple allocation of funds to DoD. One example is the restrictive language written into the annual defense appropriation acts. Restrictive language typically consists

of floors, ceilings, and line program identification and funding. An appropriation "floor" represents a minimum level below which DoD cannot spend. This type of legislation is used by Congress to ensure DoD spends a mandatory amount on a given program. DoD must spend the money by the end of the fiscal year or report to Congress why they were unable to do so. An appropriation "ceiling" represents a maximum level that DoD can spend on an item within an appropriation. DoD cannot exceed ceilings without approval from Congress. Line program identification and funding details specific uses for which funds can be spent, or stipulates the amount of funds that must be spent on each item. It is the most restrictive of all congressional appropriation measures and severely limits the discretionary actions of DoD.

Both the Authorization and Appropriation Committees have taken a more active role in the formulation of the defense budget even though their perspectives are different. The Authorization Committees are advocates for their respective funding request while the Appropriation Committees see themselves as the "guardian of the taxpayer" and pay closer attention to details, new programs, and program increases. [Ref. 9:p. 86]

In order to fully understand defense related issues, congressional committees depend heavily on their professional staff. The need to obtain detailed information on defense programs has led to a proliferation of staff.

> In 1964, the four defense subcommittees on appropriations and the Armed Services Committees had a total of 37 staff members. By 1984, the same committees and subcommittees had 60 staff. Five years later the number was up to 99. This does not include the 66 associate staff who work on defense for individual members of the same committees, or congressional support agencies. From 1960 to 1985, total congressional staff grew by 237% and personal staff by 175%. [Ref. 12:p. 20]

Due to their knowledge about defense issues and programs and their influence with congressional committee members, professional staff members have become powerful players within the authorization and appropriation decision-making process of Congress.

E. CONGRESSIONAL OVERSIGHT

The Constitution of the United States spreads governing power and authority among the three branches of government: legislative, judicial, and executive. To ensure no one branch becomes predominant, the architects of the Constitution designed a system of "checks and balances" into its framework. As a result of the safeguards in the Constitution, one of the most important roles of Congress is that of oversight.

Webster's dictionary defines "oversight" as the watchful care, management, or supervision of an activity [Ref. 13:p. 840]. Congress has the right and responsibility to oversee operations in the Executive Branch to ensure funds are properly used and laws followed. Article I, Section 8 of the Constitution provides the Congress with authority to legislate

laws considered necessary to ensure that the provisions of the Constitution are properly executed. Specifically:

> [The Congress shall have the power] to make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the Government of the United States. [Ref. 4:p. 932]

Article I, Section 9 of the Constitution requires strict accountability over the use of public funds and provides power to Congress to require submission of periodic reports to ensure that public funds are responsibly utilized. Specifically:

> No money shall be drawn from the Treasury, but in consequence of Appropriations made by law, and a regular statement and account of receipts and expenditures of all public money shall be published from time to time. [Ref. 4:p. 932]

These two sections of the Constitution mandate Congress to observe the performance of the Executive Branch to ensure public funds are spent wisely, effectively, and within their intended purposes.

The Legislative Reorganization Act directs all congressional committees to exercise oversight of agencies and programs in their jurisdiction. Section 136 states:

> ...to assist the Congress in appraising the administration of laws and in developing such amendments or related legislation as it may deem necessary, each standing committee of the Senate and House of representatives shall exercise continuous watchfulness of the execution by the administrative agencies concerned of

> any laws, the subject matter of which is within the jurisdiction of such committee; and for that purpose, shall study all reports and data submitted to the Congress by the agencies in the Executive Branch of Government. [Ref. 14:p. 94]

Primary responsibility for overseeing DoD execution of the budget lies with the defense committees which regularly hold hearings on defense issues, namely, The Armed Services Committees and Defense Appropriation Subcommittees of Congress.

The function of oversight is not unique to the Legislative Branch of Government. As noted by J. Ronald Fox, author of Defense Management Challenge:

> Each of the participants in the acquisition process [The Congress, the Office of Management and Budget, the Office of the Secretary of Defense, the Office of the Service secretary, the service headquarters, the military service material commands and industry] exercises an oversight responsibility to ensure the laws and regulations are observed and programs pursued efficiently. Consequently, there are numerous oversight and monitoring agencies. The Executive Branch has the Justice Department and the Office of Management and Budget; the Department of Defense and each military service has an independent inspector general and auditing office; and Congress uses the General Accounting Office for program audits and assessments, the Congressional Budget Office for budget and program cost estimates, and the Congressional Research Service and Office of technology Assessment for analyses. Industry has its legal resources, Washington representatives, and industry associations to protect its interests. [Ref. 15:pp. 18-19]

Congressional committees and subcommittees overseeing DoD use several means of gathering information. Several of these mechanisms for conducting oversight are discussed below.

1. Congressional Budget Office

The Congressional Budget Office (CBO) is the legislative counterpart of the Office of Management and Budget. Created by the Budget and Impoundment Control Act of 1974, the CBO supports the budget process by providing independent economic and program analysis and cost information on Executive Branch budget proposals. In addition to its primary responsibilities, the CBO also conducts special studies and analysis of defense issues at the direction of the congressional oversight committees. [Ref. 15:p. 257]

2. General Accounting Office

One of the agencies used by Congress to conduct oversight of DoD is the General Accounting Office (GAO). Established by the Budget Act of 1921, the GAO is the chief audit agency for Congress. It has the power to investigate, survey, or review program implementation and execution.

Investigations are one of the most powerful tools used by Congress. According to Jones, investigations serve three purposes relative to control of the DoD budget:

> 1. Investigations assist Congress in ensuring that the DoD is efficient in expenditure of public funds given the discretionary authority granted to the DoD for program execution.
> 2. Investigations inform the general public about the conduct of DoD officials and their administration of programs.
> 3. Investigations provide information needed by Congress to make decisions on defense and national security matters. [Ref. 10:p. 80]

Surveys and reviews of DoD programs are also conducted by GAO. A survey is a relatively short-term look into a program to see if a full review is warranted, whereas, a review is a comprehensive study of the program. [Ref. 9:p. 113]

3. Selected Acquisition Report

The Selected Acquisition Report (SAR) is a comprehensive, summary status report on major defense acquisition programs that exceed $200 million in yearly research and development funds, cost over $1 billion in yearly procurement, or have significant interest to Congress [Ref. 9:p. 125].

The SAR provides key cost, schedule, and performance information to Congress on the status of a program. This information is used by Congress to compare current estimates with earlier planning, development, or production estimates.

The SAR is submitted annually, as of December 31, to Congress. Quarterly submissions are required on an exception basis when: there has been a 15 percent or more increase in program acquisition unit cost; total program cost change by more than five percent; a six month or greater delay to current estimates of any scheduled milestone occurs; or any correction is made at cost variance calculations. [Ref. 9:p. 125]

4. Congressional Data Sheet

Because it is impossible to discuss every DoD program during budget hearings, a Congressional Data Sheet (CDS) is prepared for each major weapon system requiring authorization. The CDS is used by congressional staffs to review the procurement programs proposed by the DoD. Information submitted within the CDS includes: a narrative description, mission, cost data and basis for the requirement; characteristics and contract data, indicating contractor and award data; historical cost comparison by appropriation; inventory assets and future production deliveries; Test and Evaluation data; and flight simulator data, where appropriate. [Ref. 9:p. 124]

5. Research and Development Descriptive Summaries

The Research and Development Descriptive Summary (RDDS) is one of the most important documents submitted to Congress for program justification. It provides detailed justification of each item in the Research, Development, Test and Evaluation (RDT&E) account, and summarizes the scope and anticipated results of each program. Information included within the RDDS includes: program purpose; program status; mission contribution; and projected funds used. [Ref. 9:pp. 122-123]

6. Congressional Research Service and Office of Technical Assessment

Two other sources available to Congress to obtain information are the Congressional Research Service (CRS) and the Office of Technical Assessment (OTA). The CRS provides a variety of support services to Congress to include: information seminars for members and staff; analysis of issues; maintenance of automated data bases; preparation of digests and bill summaries; furnishing questions for committee hearings; policy analysis; and compilation of statistical information [Ref. 16:pp. 255-256]. The OTA was created in 1974 to assist Congress evaluate complex technical issues.

7. Unit Cost Report

The Unit Cost Report (UCR) is submitted by the Service Secretaries to Congress. The purpose of the report is to highlight significant cost growth early enough so that Congress can take remedial action. The UCR is submitted to Congress within 30 days for programs which: the program acquisition unit cost (PAUC) is more than 15 percent above the baseline SAR estimate; the current unit procurement cost (CPUC) is more than 15 percent above the baseline SAR estimate: or cost or schedule variance of a major contract have resulted in an increase in the cost of the contract of at least 15 percent over the initial cost of the contract. [Ref. 17:p. 18-3]

If the unit cost growth exceeds the baseline by 25 percent or more, the Secretary of Defense must certify to Congress within 30 days that the program is still required and no alternative exits; the program is essential to national defense; and the management structure is adequate to manage and control unit cost. [Ref. 17:p. 18-7]

8. Contract Award Report

Prior to awarding a contract or executing an option on any weapon system contract, DoD is required to notify Congress via the Contract Award Report. Notification to Congress allows members with constituent interest the latitude of benefiting politically from the procurement actions.

F. IMPACT OF OVERSIGHT

There has been both a positive and negative impact on defense acquisition resulting from congressional oversight. In his book, Department of Defense Systems Acquisition Management: Congressional Criticism and Concerns, John Bennett highlights four major contributions of congressional oversight. These include: [Ref. 18:pp. 209-210]

1. Exposing weaknesses of DoD business management.
2. Raising public and government interest in major systems acquisition policy.
3. Making DoD conscious of costs.
4. Justifying reductions in defense spending.

The conduct of congressional oversight, however, has its faults. In this regard, line-item budget reviews present the

impression Congress does not trust the DoD in the allocation of defense budget dollars. Selected reports to Congress, such as the SAR and UCR are time consuming to complete, yet, are not considered as useful decision documents or management tools by the recipients [Ref. 19:p. 44]. Additionally, Congress is limited in its ability to probe deeply into problems due to competing priorities and limited resources.

G. CONGRESSIONAL MOTIVATION

To a large degree, members of Congress become involved in the oversight process depending on what motivates them. Congressional members are subject to influence by numerous sources, including constituents, the Executive Branch, media, special interest groups, and industry. In The Politics of Weapons Procurement: The Role of Congress, the authors, Liske and Rundquist, believe the behavior of elected officials is driven by the capacity in which he or she is serving. These capacities are constituency, career, agency, and institution. [Ref. 20:p. 4]

A basic tenant of the Constitution is that members of Congress are elected to represent the interest of their constituents. Therefore, it is no surprise that constituent serving behavior is driven by the desire of members to address the political and economic interest of the voters back in there home states and districts. The political process of

using federal programs to benefit constituents is referred to as "pork barrel" politics.

The desire to take care of parochial interest is often seen in the enactment of defense related legislation. Classical treatment of "pork barrel" legislation begins with a legislative strategy of tailoring program proposals to meet the needs of a particular clientele and earmarking funds to the program [Ref. 6:p. 101]. The Executive agencies respond by designing programs to spread spending throughout as many key districts as possible. The goal is to gather as much legislative support as necessary to assure continued funding for the program.

Pork barrel legislation is seen by some members of Congress as wasteful and harmful to national interest.

> Political interests in Congress are often the cause of military misspending. For purely political reasons, Congress will sometimes direct the armed forces to buy a weapon or keep a base open even when military planners strenuously object. It has been estimated that $5 billion could be cut from the defense budget if legislators stopped seeking unjustifiable outlays for the benefit of their own districts and states. [Ref. 10:p. 95]

Other members of Congress have expressed an opposite viewpoint, accepting "pork barrel" politics as a natural extension of their Constitutional responsibility of representation. Statements from members of Congress support this view:

[Eagleton (D-MO)]: I'm from greater St.Louis, and I know how the economy in the area would atrophy if McDonnell weren't there. So that's bound to influence my thinking. I confess to being biased. [Ref. 10:p. 96]

[Downey (D-NY)]: When the A-6 Intruder [Grumman] was going to be killed, I'm the Congressman from that district and I'm on the Armed services committee. It's my job, whether I think the A-6 is good or not, to support it. [Ref. 10:p. 96]

Regardless of their public views on the topic, most members of Congress participate in some form of "pork barrel" politics because it impacts the next category of behavior, career serving.

Career serving behavior is motivated by a member's personal goals, desires, and ambitions. Members of Congress can help their careers by serving their constituents, doing favors for influential people, supporting their political party, and tending the needs of special political interest groups. Favors are normally returned in the form of campaign contributions, access to information, or reelection support. Career serving behavior is one of the most powerful influences on congressional decision-making.

Agency serving behavior is driven by a member's legitimate concern over the efficient and effective functioning of governmental agencies. In this framework, a member's perception of the Executive Branch is very important. If the DoD acquisition process, for example, is perceived as weak and inefficient, a member exhibiting this type of behavior would most likely seek increased oversight of the acquisition

process or call for acquisition reform. The welfare of the nation and support of national policy objectives are the top motivator in this category.

Institution serving behavior is similar to agency serving except the member's behavior is motivated by his desire to influence a legislative agenda.

H. SUMMARY

The Constitution of the United States establishes mandates for the control of the DoD budget. Chapter two detailed some of the controls used by Congress to regulate defense acquisition. These were broadly defined into two categories: budget formulation through the authorization and appropriation process, and budget execution oversight through activities such as investigation and reports.

The Defense Committees of Congress are key players in the authorization and appropriation process and oversight function. Committee members depend heavily on their professional staffs to gather and analyze information for decision-making. At their disposal are a variety of methods to conduct oversight including the GAO, CBO, and mandatory reports from DoD.

In the area of motivation, two key points were made. First, members of Congress are very opportunistic in advancing their own agendas in budget negotiation and oversight. Second, decisions made by members of Congress are often a reflection

of the capacity in which they are serving: constituency, career, agency, or institution.

III. THE EXECUTIVE BRANCH

A. THE ACQUISITION PROCESS

The Office of Management and Budget (OMB) Circular A-109, published in 1976, outlines policy and guidance for the acquisition of major weapon systems. Its primary purpose is "to assure the effectiveness and efficiency of the process of acquiring major weapon systems." [Ref. 21:p. 3] In order to achieve its goal of increasing effectiveness in major systems acquisition, several program management objectives are listed. These include:

1. Ensure that each major system: Fulfills a mission needs; operates effectively in its intended environment; demonstrates a level of performance and reliability that justifies the allocation of the nation's limited resources for its acquisition and ownership.
2. Depend on, whenever economically beneficial, competition between similar or differing system design concepts throughout the entire acquisition process.
3. Ensure appropriate trade-off among investment costs, ownership costs, schedules, and performance characteristics.
4. Provide strong checks and balances by ensuring adequate system test and evaluation. Conduct such tests and evaluation independently, where practical, of developer and user.
5. Accomplish system acquisition planning, built on analysis of agency missions, which implies appropriate resource allocation resulting from clear articulation of agency mission needs.
6. Tailor an acquisition strategy for each program as soon as the agency decides to solicit alternative system design concepts that could lead to the acquisition of a new major system and refine the strategy as the program proceeds through the acquisition process.
7. Maintain a capacity to: Predict, review, assess,

> negotiate and monitor cost for system development, engineering, designing, demonstration, test, production, operation, and support. Assess acquisition cost, schedule and performance experience against predictions...provide assessments where significant costs, schedule or performance variances occur. [Ref. 21:pp. 4-5]

The principal implementation guidance for defense systems acquisition is Department of Defense Directive (DoDD) 5000.1, "Defense Acquisition" and Department of Defense Instruction (DoDI) 5000.2, "Defense Acquisition Management Policies and Procedures". DoDD 5000.1 implements the concepts of OMB Circular A-109 and attempts to forge an interface among the three decision-making support systems: requirements generation, acquisition management, and planning, programming, and budgeting (PPBS).

The major system acquisition process can be viewed as a sequence of program activity phases and decision events directed towards the accomplishment of program objectives. The acquisition process for major systems, as outlined in DoDI 5000.2, begins with a mission need and progresses through five phases: Concept Exploration and Definition (Phase 0), Demonstration and Validation (Phase I), Engineering and Manufacturing Development (Phase II), Production and Deployment (Phases III) and Operations and Support (Phase IV). [Ref. 22:pp. 3-4]

Before the start of each phase in the system acquisition process, the need for the system is reviewed. Following the review, a decision is made to continue, modify, or discontinue

the program. During the acquisition process, five milestone decision reviews are conducted: Concept Studies Approval (Milestone 0), Concept Demonstration Approval (Milestone I), Development Approval (Milestone II), Production Approval (Milestone III) and Major Modification Approval (Milestone IV). [Ref. 22:pp. 3-4]

1. Determination of Mission Need

An acquisition program is based on an identified mission need. A mission need seeks to establish a new operational capability, improve an existing capability, or correct a warfighting deficiency. Mission needs are evaluated to determine if they can be satisfied by changes in doctrine, operational concepts, tactics, training or organization. If the mission need cannot be satisfied by these alternatives, a Mission Need Statement is prepared and submitted through the acquisition chain of command for approval. [Ref. 22:p. 3-2]

2. Concept Studies Approval (Milestone 0)

The first key decision event, Concept Studies Approval, occurs when the milestone decision authority determines what action should be taken on the Mission Needs Statement. The milestone decision authority may be either the Under Secretary of Defense for Acquisition and Technology (USD(A&T)), or the appropriate individual within the Services depending on the acquisition category of the proposed major system. For those Mission Need Statements receiving favorable

consideration, the milestone decision authority issues an Acquisition Decision Memorandum specifying a minimum set of alternative concepts to be examined, the lead organization, and the exit criteria. Approval of Concept Studies signals permission to enter the Concept Exploration and Definition phase of the life-cycle but does not establish a new program. [Ref. 22:p. 3-4]

3. Concept Exploration and Definition (Phase 0)

During the Concept Exploration and Definition phase both the developer and user are heavily involved. Studies of alternative concepts are solicited from industry, universities, and research and development centers. The user of the proposed system continues to refine the operational performance parameters and minimum acceptable operational requirements. The objectives of this phase, according to DoDI 5000.2, are to:

1. Explore various material alternatives to satisfying the documented mission need.
2. Define the most promising system concept(s).
3. Develop supporting analysis and information to include identifying high risk areas and risk management approaches.
4. Develop a proposed acquisition strategy and initial program objectives for cost, schedule, and performance for the most promising system concept(s). [Ref. 22:p. 3-8]

4. Concept Demonstration Approval (Milestone I)

The Concept Exploration and Definition phase terminates in a milestone decision review. This review,

Concept Demonstration Approval, evaluates the feasibility and affordability of establishing a new acquisition program. A favorable decision at Milestone I initiates a new acquisition program; establishes a Concept Baseline containing initial program cost, schedule, and performance objectives; and authorizes entry into the next phase of the acquisition process. [Ref. 22:p. 3-10]

5. Demonstration and Validation (Phase I)

During the Demonstration and Validation phase emphasis is on validating the approved design concepts and selecting the system which is most capable of satisfying the mission need. The objectives of this phase, according to the DoDI 5000.2, are to:

1. Better define the critical design characteristics and expected capabilities of the system concept(s).
2. Demonstrate that the technologies critical to the most promising concept(s) can be incorporated into system design(s) with confidence.
3. Prove that the processes critical to the most promising system concept(s) are understood and attainable.
4. Develop the analyses/information needed to support a Milestone II decision.
5. Establish a proposed Development Baseline containing refined program cost, schedule, and performance objectives for the most promising design approach. [Ref. 22:p. 3-4]

6. Development Approval (Milestone II)

According to DoDI 5000.2, the Milestone II objectives are to:

1. Determine if the results of Phase I, Demonstration and Validation, warrant continuation.

2. Establish a Development Baseline containing refined program cost, schedule, and performance objectives for a program approved for continuation. [Ref. 22:p. 3-18]

Development approval typically involves a commitment to low-rate initial production. Low-rate initial production quantities must be identified by the milestone decision authority for major acquisition programs.

7. Engineering and Manufacturing Development (Phase II)

The primary goals of Engineering and Manufacturing Development are to gain production approval and to prepare for full-scale production of the system which best meets mission needs and program objectives. During this phase, the most promising concept selected is refined and developed into a stable, producible, affordable system. Representative systems manufactured during this phase are also used to conduct both development and operational testing. Development testing measures system performance against contract specifications. Operational testing measures system performance against the user's minimum operational performance. Low-rate initial production of the system verifies the adequacy of the production process and provides a realistic estimate of production costs. [Ref. 22:p. 3-20]

8. Production Approval (Milestone III)

The Milestone III review, Production Approval, addresses the results of operational testing; production and deployment schedules; production cost verification;

affordability and life-cycle cost; and plans for integrated logistics support. It is the most important of all decision reviews because a favorable decision at this point represents a huge financial and resource commitment to build, deploy, and support the system. Once approved, a Production Baseline is established containing refined cost, schedule and performance objectives for the program. [Ref. 22:p. 3-20]

9. Production and Deployment (Phase III)

The primary goal of the Production and Deployment phase is to produce and deliver an effective, fully supported system at the lowest cost. Key objectives in this phase of the system life cycle, according to DODI 5000.2, are to:

1. Establish a stable, efficient production and support base.
2. Achieve an operational capability that satisfies the mission need.
3. Conduct follow-on operational and production verification testing to confirm and monitor performance and quality. [Ref. 22:p. 3-27]

Depending on the production baseline, this phase of the system cycle may last several years.

10. Operations and Support (Phase IV)

Logistics support is a vital element in the success of any acquisition program. Because of this, the Operations and Support phase begins with initial system fielding and overlaps the Production and Deployment phase. The objectives of the Program Manager during this phase are to ensure the fielded

system continues to provide the capabilities required to meet the identified mission need and to identify shortcomings or deficiencies that must be corrected to improve performance.

B. MAJOR MODIFICATION (MILESTONE IV)

A large portion of the DoD budget is used to modify existing systems. Major systems are modified to correct system deficiencies discovered during operational use; to increase system performance; and to counter an emerging threat. The underlying theme with all modification is that they extend the system's useful life and offer a cost-effective alternative to new weapon procurement.

Most major system modifications result from a Milestone IV, "Major Modification Approval," review by the decision authority. The primary purpose of the review is to determine if a major upgrade to the system currently in production is warranted. Different procedures are followed for weapon systems no longer in production. DoDI 5000.2 states,

> When a system is no longer in production, a deficiency resulting from a change in threat; defense policy, or technology must be defined in a new Mission Need Statement. The intent is that potential system modifications should compete with all other possible alternatives during a new phase 0, Concept Exploration and Definition. [Ref. 22:p. 3-29]

If a major modification program is approved for a system still in production, the milestone decision authority will determine the acquisition phase to be entered. This decision will be

based on the amount of resources committed and the level of risk.

The amount of money allotted to some modifications can be significant. The total program cost of the F-14D upgrade, for example, exceeded one billion dollars annually on several occasions [Ref. 23:p. 13]. When system modifications are very large, they are budgeted and funded as if they were new development efforts.

Planning for a modification is similar to new system development. The Program Manager establishes an acquisition strategy and baseline for the modification program. Together, these two items provide a framework for managing the program and serves as a guide in reducing risk.

C. DEFENSE ACQUISITION BOARD

The Defense Acquisition Board (DAB) is the primary forum of decision-making within the Department of Defense (DoD) for acquisition programs. The DAB conducts management of major defense acquisition programs as they proceed from requirement and concept definition through production and deployment. The DAB is chaired by the Under Secretary of Defense for Acquisition & Technology (USD(A&T)), who also serves as the milestone decision authority for major defense programs. Other key members of the DAB include the Vice Chairman of the Joint Chiefs of Staff; the Director, Defense Research and Engineering; the Assistant Secretary of Defense for Program

Analysis and Evaluation; and the Component Acquisition Executives. [Ref. 24:pp. 1-4]

Formal DAB reviews are conducted at each milestone to assess program accomplishments during the previous life-cycle phase and to assess readiness to proceed to the next phase. According to Joseph Schmoll, author of Introduction To Defense Acquisition Management, typical issues addressed in DAB proceedings include, "cost growth, schedule delays, technical threshold breaches, supportability issues, acquisition strategy, threat assessment, test and evaluation highlights, cooperative development/joint service concerns, manpower evaluation, and operational effectiveness/suitability." [Ref. 25:p. 19] At the conclusion of the DAB review, the (USD(A&T)) issues his decisions and guidance through the Acquisition Decision Memorandum (ADM).

The decision-making role of the DAB is not limited to milestone decision reviews. In support of its oversight functions and management responsibilities for the DoD Acquisition System, the DAB also:

1. Makes recommendations to the Defense Acquisition Executive (DAE) on DoD acquisition policies.
2. Promotes coordination, cooperation, and mutual understanding of matters related to the DoD Acquisition System, particularly those involving cross-service and Allied management of joint programs, within DoD and between DoD and other Federal Agencies, and with Cooperative Programs with Allied Nations.
3. Recommends procedures that implement policy initiatives which streamline and improve the efficiency and effectiveness of the DoD Acquisition System.
4. Develops recommendations regarding alternative near-

term and long-term acquisition strategies, plans, and resource levels.
5. Identifies issues and concerns and develops recommendations regarding acquisition policy and guidance matters.
6. Identifies issues for study and analysis by the appropriate Acquisition Committees of the DAB. [Ref. 24:pp. 1-2]

D. PLANNING, PROGRAMMING, AND BUDGETING SYSTEM

Knowledge of how DoD allocates resources is essential to understanding the defense acquisition process. The resource management system in use by DoD was first introduced, in 1961, by former Secretary of Defense Robert S. McNamara. Since that time, it has remained relatively unchanged and is known as the Planning, Programming, and Budgeting System (PPBS).

The PPBS is a decision-making process for allocating resources among a number of competing programs or alternatives which support national strategy. The ultimate objective of PPBS is to provide operational commanders with the best mix of forces, equipment, and support attainable within fiscal constraints. To achieve this objective, PPBS is broken into three distinct but interrelated phases: planning, programming, and budgeting. [Ref. 25:p. 30]

1. Planning

Planning, the first phase of PPBS, begins with the collection and evaluation of strategic intelligence concerning military capabilities and political intentions of foreign nations. Once the overall threat to the security of the

United States and its vital interest has been evaluated, broad strategies for dealing with the threats and the force levels supporting those strategies are developed. The Under Secretary of Defense for Policy (USD(P)) is responsible during this phase for integrating defense-wide policies with respect to manpower, logistics, and acquisition. [Ref. 26:p. C13]

The key document resulting from the planning process is the Defense Planning Guidance (DPG). The DPG provides force and fiscal guidance to the Services necessary to construct their respective program proposals and ultimately, their budgets. The DPG includes an assessment of the threat to U.S. interest; a statement of U.S. defense policy and strategy; a general assessment of military requirements for defending the national interests; and an assessment of the material and financial resources available for defense programs in the future. Once approved by the SECDEF, the DPG becomes the basis for the programming phase. [Ref. 26:p. C15]

2. Programming

Programming, the second phase of PPBS, begins with receipt of the DPG. During this phase, each military service constructs a detailed list of proposed programs in terms of forces, personnel, materials, and dollars to satisfy the strategic requirements specified in the DPG. These program proposal cover a six year period and are submitted in the form of Program Objective Memoranda (POMs). The POM then becomes

the Service's request for resources to accomplish its mission. [Ref. 26:p. C17-C27]

Once the POM completes service review, it is forwarded to the Defense Planning and Resources Board (DPRB). The DPRB is a high level DOD group that assists the SECDEF in managing the PPBS. Key members include: the Under Secretaries of Defense for Acquisition & Technology (USD(A&T)) and Policy (USD(P)), the DoD Comptroller, the Assistant Secretary of Defense for Program Analysis and Evaluation, and the Director of Defense Research and Engineering [Ref. 25:p. 16]. The DPRB's decisions regarding Service programs are submitted to the SECDEF for approval. After the SECDEF makes the final POM decisions, they are recorded in Program Decision Memoranda (PDM). The PDM approves the POM with specific changes and becomes the basis for Budget Estimate Submission (BES). Issuance of the PDM to each Service is the last step in the programming phase.

3. Budgeting

Budgeting is the third and final phase of the PPBS cycle. Its purpose is to translate planning and programming guidance into annual funding requirements.

The defense budget is prepared by the Office of the Secretary of Defense (OSD) for inclusion into the President's Budget. The process begins when the SECDEF receives budget estimates from the Services. Hearings are held jointly with

the Services, OSD, and OMB to determine the adequacy of the estimates and to identify less costly alternatives where possible. The results of the SECDEF budget hearing on the DoD Component budget requests are issued in a Program Budget Decision. After Service appeals have been addressed, the DoD budget request is submitted to OMB for incorporation into the President's Budget. [Ref. 26:pp. C28-C30]

E. ACQUISITION STRATEGY

The Program Manager is required by DoD policy to develop a comprehensive framework for planning and managing an acquisition program. This framework, the acquisition strategy is defined as "a business and technical management approach designed to achieve program objectives within resource constraints imposed." [Ref. 27:p. B-3] The acquisition strategy covers the entire life cycle of the system and is tailored to fit the needs for developing, producing, and fielding the system. In order to develop a successful acquisition strategy, DoDI 5000.2 outlines several important guidelines:

1. An acquisition strategy should minimize the time and cost of satisfying an identified, validated need.
2. The acquisition strategy will be tailored to match the character of the program and allow the most efficient satisfaction of individual program requirements, consistent with the degree of risk involved.
3. The acquisition strategy should be developed in sufficient detail to establish the management approach that will be used to direct and control all elements of a program.

4. The strategy should be developed in sufficient detail to establish the managerial approach that will be used to direct and control all elements of the acquisition to achieve program objectives.
5. The strategy will be kept current and formally updated at each milestone decision point as the system approach and program elements are better defined. [Ref. 22:p. 5-A-1]

A well-structured acquisition strategy allows the program manager to control the key variables of cost, weapon system performance, schedule, and supportability. It also serves as a long range planning guide for program execution and as a management tool for the Program Manager. Captain Bruce Bisset, USMC, in his thesis entitled "Acquisition Strategy Development at Program Initiation: Concepts, Realities, and Methodology," listed several constraints and limitations which shape the formulation and execution of the acquisition strategy. Key among these are:

1. Economic Pressures - The high price of weapon systems has increased pressures to hold down program costs.
2. Political Pressures - Political concerns from both the Legislative and Executive Branches of Government have forced the program manager to consider the ramifications of each strategy option as well as the likelihood of its acceptance.
3. Resource Limitations - As the budget continues to decrease, there will be increased competition for limited resources. The program manager must pay close attention to the status of program funding because a reduction normally leads to a reduction of planned efforts and the rescheduling of tasks for a later date.
4. Schedule Requirements - There is constant pressure to reduce the time it takes to acquire and field a weapon system. Whenever scheduling requirements dominate, the choice of acquisition strategies available to the program manager is reduced resulting in poor management of the program. [Ref. 28:pp. 36-38]

Even though DoDI 5000.2 emphasizes the acquisition strategy must be tailored to fit the unique aspects of the program, often the program manager is limited in his formulation by these economic, technical, and political factors.

Some of the tools and techniques available to the Program Manager to control the key variables of cost, schedule, performance, and supportability are discussed below. These are integrated into the acquisition strategy and become an integral part of the strategy on which the success or failure of the program is judged.

1. Concurrency

Concurrency is a scheduling strategy which combines or overlaps design, testing, production and deployment activities. Its principal objective is to shorten the overall delivery schedule so that the user can obtain an earlier operational capability. Use of concurrency by the program manager as part of his acquisition strategy increases program risk. If the technology is advanced and the system is complex, cost growth, schedule slippage, and performance shortfalls are likely to occur if difficulties arise during production. Since concurrency does entail a substantial risk, the Program Manager must evaluate the trade-off of earlier capability with the potential cost, schedule, and performance difficulties which could occur.

2. Acquisition Streamlining

Acquisition streamlining seeks to reduce the cost and time it takes to acquire a weapon system while still maintaining or improving the quality of the product. As defined by DoDD 5000.2,

> Acquisition streamlining is any effort that results in more efficient and effective use of resources to develop or produce quality systems. This includes ensuring that only necessary and cost-effective requirements are included.... [Ref. 22:p. 15-2]

Streamlining requires extraordinary cooperation and teamwork between the Government and the contractor to eliminate non-essential requirements from the contract. This can be accomplished in several ways:

1. State requirements in terms of performance rather than design.
2. Use non-developmental items wherever possible.
3. Involve industry early in the acquisition effort to take advantage of industry expertise to improve the acquisition strategy.
4. Eliminate all non-essential data requirements.
5. Do not apply design solutions, specifications, and standards prematurely. [Ref. 22:p. 10-C-1]

Program Managers and contractors can also apply the streamlining concept to test planning and logistic support analysis. Streamlining in these two areas are particularly well-suited for weapon system modifications or upgrades due to the lower technical risks involved.

3. Preplanned Product Improvement (P3I)

Traditionally, most major system improvements and modifications have been revolutionary in nature. Revolutionary development begins with a product improvements idea. The idea is then developed, verified, tested, produced, and finally applied to the system. This costly, time-consuming method for improving a system normally averages five years for major systems. [Ref. 22:p. 5-A-5]

In 1981, the Acquisition Improvement Program mandated the use of a new acquisition strategy, P3I, to reduce program cost and schedule. DoDI 5000.2 defines P3I as an evolutionary acquisition concept. Its objective is to allow fielding of a new system using mature technology while planning and configuring for incremental improvements to the system. Preplanned product improvements allow a system to be produced which is capable of meeting the current threat while planning for incorporation of emerging technologies after the system is deployed. [Ref. 22:p. 5-A-5]

In addition to extending a weapon system's useful life and reducing the need for replacement systems, P3I also has several other advantages. These include:

1. Earlier initial operational capability date for the baseline system.
2. Reduced overall acquisition, operating, and support cost.
3. Reduced technical, cost, and schedule risk.
4. Enhanced operational capability for the "final" system.

5. Responsiveness to threat changes and future technology development. [Ref. 29:p. 4.2-1]

Even though P3I offers many advantages, implementation of a P3I strategy does have several inherent risks. From a budgetary viewpoint, the implementing Service, DoD, and Congress must demonstrate a commitment to acquiring the system under the P3I concept. This includes accepting higher initial costs to obtain growth potential for future exploitation. Additionally, research, development, testing and evaluation funding must continue to flow into the program office in order to pursue development of deferred performance improvements. Lack of funding support after production and fielding of the basic system leaves the program vulnerable to "gold plating" criticism.

The term preplanned product improvement is often confused with product improvement. Preplanned product improvement differs from product improvement in that it is planned growth. The need for eventual modification is recognized during the early development stages, and the acquisition strategy is designed to include provisions for ensuring that these modifications can be effectively introduced. Product improvements, on the opposite spectrum, are unplanned and normally not seen in the acquisition strategy. Product improvement is applied when a system is in the field and modifications must be incorporated to overcome problems. These changes normally include reliability,

availability, and maintainability (RAM) improvements; standardization or interoperability upgrades; and safety modifications. [Ref. 1:p. 16-2]

Operationally, the decision to use P3I should be made as early as possible by the Program Manager. An early decision gives the contractor the opportunity to design the baseline system so that subsystems can easily be broken out for development and replacement. Poor baseline design which does not take into account future system growth requirements cause retrofit and modifications to become both costly and timely.

4. Standardization

Standardization is "the process by which the Department of Defense achieves the closest practicable cooperation among the Services and Defense agencies for the most efficient use of research, development, and production resources, and agrees to adopt on the broadest possible basis the use of common or compatible components, supplies, or equipment." [Ref. 27:p. B-104]

Standardization is normally associated with technical risks. Technical risks are minimized by using components or systems that are in wide use and have established performance and reliability histories. Additionally, commonality allows the weapon system to benefit from development efforts which

are already underway or which has been completed by other programs.

5. Competition

Another policy which influences the activities of a Program Manager when developing and implementing his acquisition strategy is DoD's policy regarding competition. DoDI 5000.2 requires the Program Manager to describe plans to develop a competitive environment in all phases of the acquisition strategy [Ref. 22:p. 5-A-2]. The basic assumption behind competition is that it leads to a higher quality product at a lower cost.

Even though the benefits of competition are well recognized, there are instances when competition is not practical. This is normally the case in major system modifications because one company is usually the sole developer and manufacturer. When this occurs, the cost to the Government of developing a new source of manufacturing or acquiring a competitive level data package is often prohibitive.

IV. THE F-14 UPGRADE

A. INTRODUCTION

The F-14 is an all-weather, carrier-based, aircraft capable of performing air superiority, fleet air defense, and air-to-ground missions. The original version was the F-14A, a variable sweep wing, supersonic fighter with vast targeting and engagement capabilities. It featured the AWG-9 weapon control system which was capable of tracking and shooting at multiple targets in a heavy electronic counter-measure (ECM) environment. The F-14A was powered by two Pratt & Whitney TF-30-P-412 turbofan engines originally designed for the F-111B program.

In 1984, the first major system upgrade to the Grumman F-14 began. The F-14D was designed to be a tremendous improvement over the original F-14A. Its engines, a marinized version of the General Electric F110, offered a 30% increase in combat rated thrust as well as greater flexibility and maintainability. The F-14D also contained a new digital avionics package and the improved Hughes APG-71 radar for increased detection and targeting. The entire package of upgrades would allow the F-14D to perform its air superiority mission for the fleet well into the 21st century.

Despite meeting all major acquisition milestones and being within five percent of budget, the F-14D program was terminated by the DoD in 1991. This chapter examines the events surrounding the government's decision to modify and later cancel the F-14 upgrade.

B. BIRTH OF THE F-14A

Battles fought in the Pacific Theater during World War II demonstrated the strategic importance of naval maritime force projection. Dominant naval forces were able to establish their own lines of communication (LOC), disrupt or sever the enemy's LOC, choose the time and place of offensive action, and, most importantly, carry the war to the enemy's homeland.

By the end of the war, airpower had become the dominant factor in the Pacific Theater. Naval battles were no longer fought between surface combatants, but at extended range by aircraft launched from opposing carriers or nearby islands. As a result of changing naval tactics, the battleship soon became obsolete and the Aircraft Carrier Battle Group (CVBG) rose to become the linchpin of U.S. Naval force projection.

By the late 1950's, the U.S. Navy had over 50 aircraft carriers in service [Ref. 30:p. 24]. The large number of aircraft carriers in the U.S. Navy did not go unnoticed by the Soviet Union. As Cold War tensions increased, Soviet Naval Aviation (SNA) incorporated the use of long-range bombers into its maritime strategy. More significantly, the Soviets were

on the verge of producing offensive air-to-surface cruise missiles capable of hitting targets up to 150 miles away [Ref. 31:p. 2]. Soviet bombers, armed with these stand-off cruise missiles, could attack U.S. aircraft carriers prior to engagement by conventional fighters.

The expanding Soviet bomber force, along with the growing cruise missile capability, was becoming more than the existing F-4 fighter could defend against. Naval strategists recognized the shortcomings of the F-4 and began planning for a new, long-range fleet air defense fighter. The Navy required an aircraft that could carry a large quantity of air-to-air missiles, have the endurance to remain on combat air patrol for several hours, and was capable of defeating Soviet bombers before they could launch their missiles at the American carriers. [Ref. 32:pp. 10-15]

The Navy's first two attempts at developing an aircraft to meet the requisite features of its next fighter were unsuccessful. The first proposed candidate, the Douglas F-6D Missileer, lacked versatility and was canceled by the Eisenhower Administration in 1960. The second candidate aircraft, the Grumman F-111B, was a naval variant of the General Dynamics F-111 strike aircraft. The F-111B was built to carry the AWG-9 intercept radar and the AIM-54 Phoenix long-range air-to-air missile which was capable of destroying enemy bombers before they came within range of the fleet. After experiencing numerous performance and weight growth

problems, the F-111B was deemed unsuitable for carrier operations. [Ref. 33:pp. 1-5]

As Navy and congressional support waned for the F-111B, Grumman proactively submitted an unsolicited proposal, Design 303, as an alternative to the F-111B. This new design proposal would incorporate the F-111's engines, weapon system, and variable sweep wing concept and place them on a more capable airframe. This design would later become known as the F-14 Tomcat. [Ref. 33:pp. 3-5]

C. PROCUREMENT PLAN

On January 14, 1969, only six months after the formal cancellation of the F-111B program, Grumman Aerospace Corporation was awarded a contract to build the F-14 as the Navy's next air superiority aircraft. The Navy negotiated separate contracts with Hughes Aircraft for the avionics systems and Pratt & Whitney for the engines. These two major items would be provided to Grumman as Government Furnished Equipment (GFE). [Ref. 33:p. 9]

In retrospect, the most significant element of the F-14 contract was its engines. The F-14 was designed around the Advanced Technology Engine which would not be available in time for initial production. In order to get the aircraft quickly to the fleet, the Naval Air Systems Command sanctioned a modified version of the F-111B engine for use in the Tomcat. This engine, the TF-30-P-412, would be installed in only the

first 67 F-14s until Pratt & Whitney delivered its new Advanced Technology Engine in 1970 [Ref. 34:p. 1]. These aircraft would be designated as F-14A's.

At the end of the F-14A production cycle, it was assumed that the new F-401 ATE would be ready. Plans called for 643 more aircraft to be produced with the new engine [Ref. 35:p. 1]. These aircraft would be the F-14B model.

Pratt and Whitney was unable to deliver the F-401 ATE in 1970. As state of the art technology, the F-401 ATE developed problems in the areas of reliability, endurance, and ability to withstand rapid throttle movement. By 1971, the Office of the Secretary of Defense had reduced the planned number of F-14s to 301 because of technical problems and cost overruns in the F-401 ATE program. [Ref. 35:p. 2]

As problems continued to mount for the Advanced Technology Engine, the Navy continued to push back the expected delivery date for the F-401 ATE. Eventually, the Navy concluded that the cost of bringing the F-401 ATE to an acceptable level of reliability and performance was prohibitive. In March of 1974, the Navy decided to terminate the F-401 ATE program. When the F-401 ATE program died, so did the F-14B and follow-on programs. [Ref. 35:p. 3]

The decision to cancel the F-401 ATE meant that all future production lots of the F-14 would be equipped with the older, less satisfactory TF-30 engine. The Pratt & Whitney TF-30 engine had many faults which hindered the performance of the

F-14. The engine was underpowered and lacked the thrust necessary to launch the aircraft from its carrier or to respond rapidly in aerial combat. The F-14A had to depend on an afterburner attached to the tailpipe of the engine to increase its power or thrust. Not only did afterburners add unnecessary weight to the aircraft, but its use also consumed large amounts of scarce fuel. Continued use of the aircraft's afterburner significantly increased the risk of engine compressor stalls. [Ref. 30:pp. 38-39]

The TF-30 engine had poor throttle response and very small stall margin which made carrier landings both difficult and precarious. The reliability and maintainability of the engine was extremely poor. For every hour of flying time, Naval Air System Command estimated the fighter required about 49 man-hours of maintenance work [Ref. 36:p. 30]. Failure in the fan sections of the engine caused in-flight fires which resulted in the loss of several aircraft [Ref. 37:p. 1]. To address its continued concerns with the TF-30 engine, the Navy instituted the F-14 Survivability Improvement Program to examine the F-14's engine reliability problem.

Even though several improvements were made by the engine manufacturer to correct safety shortcomings of the TF-30 engine, a permanent solution to remedy the F-14 engine deficiency was stalled. Studies undertaken in the late 1970's to provide the F-14 with its true design thrust engine went

nowhere because of the emergence of a new internal threat, the lightweight fighter lobby.

D. LIGHTWEIGHT FIGHTER LOBBY

By the early 1970's, the high cost of the F-14A and its Phoenix weapon system had convinced many legislators that a large inventory of smaller, less expensive aircraft would better meet national defense needs. These legislators, led by Senator William Proxmire of Wisconsin and Senator Symington, the former Secretary of the Air Force, felt they had a better plan for the future of military aviation and set out to advance their case for a new lightweight fighter. In September 1973, The SASC gave its guidance to the Department of the Navy on this issue:

> The committee believes the Navy should examine the potential of a completely new aircraft as a possible alternative to the F-14 in the out-years. The Navy should obtain proposals to determine if a smaller and presumably cheaper aircraft can be designed to serve as an air superiority fighter to complement the F-14. Once this determination has been made, the committee desires to receive the Navy determination, including the costs of such alternatives as well as a technical evaluation. [Ref. 38:p. 31]

The Navy's response to this guidance was the formation of a study group to examine the potential of a lightweight fighter to be the F-14 complement.

Navy Fighter Study IV was the final product of this groups review of issues facing naval aviation. One of the most

important findings of the study highlighted the need for a multi-mission aircraft possessing both fighter and long-range strike capability [Ref. 39:p. 31]. The need for a multi-mission aircraft was driven not as much by need as it was by future affordability concerns. The escalating cost of modern weaponry had seemingly numbered the days of specialized aircraft.

In 1974, The Navy sought proposals from the aircraft industry for a new lightweight multi-mission fighter aircraft. Congress intervened in the acquisition process and directed the Navy to investigate versions of the General Dynamics YF-16 and Northrop YF-17 lightweight fighter prototypes, then under evaluation by the U.S. Air Force. [Ref. 39:pp. 32-36]

The Navy concluded that the General Dynamics design based on the F-16 was unsuitable for carrier operations. In the interim, McDonnell Douglas, with its expertise in building aircraft for the Navy, had teamed with Northrop to build the F/A-18 aircraft based on the Northrop YF-17 design. [Ref. 30:p. 54] This aircraft, with minor modifications to its engines, fit the requirements sought by the Navy. The F/A-18 aircraft was selected by the Navy as its premier strike fighter aircraft. McDonnell Douglas would be the prime contractor and Northrop, the associate. The F/A-18 had unusually strong support from several Congressmen who felt responsible for its inception. Leading the congressional support for the F/A-18 was Senator Symington, whose district

in Missouri included the McDonnell Douglas corporate headquarters. [Ref. 39:pp. 32-36]

The lightweight fighter lobby within the Navy considered the F-14 a potential threat to the existence of the F/A-18. Navy actions implied that no improvements to the F-14 could be made which might make the F/A-18 look unnecessary, inefficient, or too costly for the capability provided. Continued development of the F-14 beyond its initial configuration model was significantly curtailed. Money for engine upgrades and the development of the F-14 air-to-ground capability was diverted to the F/A-18 program. Since the F/A-18 was the designated strike fighter for the Navy, the Service went as far as to discourage F-14 contractors from distributing photographs of their aircraft carrying air-to-ground ordnance. [Ref. 30:p. 55]

The paucity of funds to perform much needed upgrades to the F-14A would continue for several years. It was not until Fiscal Year 1977 (FY 77) that Congress would authorize money to conduct research and development for a new F-14 engine [Ref. 40:p. 1]. By this date, at least six aircraft had been lost, directly due to engine problems [Ref. 41:pp. 9-15]

E. THE F-110 ADVANCE TECHNOLOGY ENGINE

The F-14 procurement plan had originally called for limited production of the F-14A, followed by extensive production of the F-14B, with improved engines. A version

designated F-14C had also been envisioned as a follow-on in the late 1970's. It was to have improved avionics, radar and fire control systems, but this program died in the conceptual stages along with the F-401 engine and the F-14B. [Ref. 34:p. 2]

The breakthrough for a new fighter engine for the F-14A came with the development of the General Electric F101 Derivative Fighter Engine (DFE) originally designed as a replacement for the U.S. Air Force F-15 and F-16 fighters. A naval version of this engine, the F110-GE-400, would finally provide the F-14 with many of the critical features it had been missing.

The General Electric F-110-GE-400 Advanced Technology Engine was able to produce over 27,100 pounds of thrust, a 30% increase in combat rated thrust over the TF-30 engine [Ref. 30:p. 42]. Use of the new engine eliminated the need for afterburners on catapult launches. Fuel savings increased time on station for combat air patrol missions by 34%. This translated into an estimated 31 minutes of combat air patrol loiter time at 150 nautical miles(nm) or a patrol radius extension of 114nm [Ref. 30:p. 42]. The F-110 engine had no restriction for angle of attack operations and was able to increase the speed and acceleration of the aircraft throughout its flight envelope. Throttle restrictions were eliminated as were bothersome engine compressor stalls which haunted the TF-30 engine. With the F-110, the Navy had finally found an

engine to make the F-14 the total air superiority fighter it was envisioned to be.

F. THE NEED FOR A NEW FIGHTER

The crucial impetus for the first major upgrade to the F-14 would finally come in the early 1980's, from the new Secretary of the Navy (SECNAV), John Lehman. Considered by some in the Navy to be acerbic and overly ambitious, Lehman was nonetheless both a skilled politician and staunch proponent of naval power.

As SECNAV, Lehman pushed a maritime strategy agenda which was predominately offensive in nature. He believed that the reason we had a Navy was to fight the Soviets, offensively, by assembling and sending carriers forward. During the initial phase of maritime strategy execution known as "seizing the initiative," carrier battle groups (CVBG) would establish sanctuaries to conduct operations. The predominant fighter mission during this phase was defending the CVBG and other maritime assets from Soviet airborne threats, such as bombers and cruise missiles. For a fighter to be effective in this environment, it required endurance, supersonic performance, a powerful radar, extremely sophisticated avionics, and multi-shot weapon capability. [Ref. 43:p. 103]

During follow-on phases of the maritime strategy, power projection strike support became the dominant fighter mission. Here, the fighter was required to defeat sophisticated enemy

air defense threats and take the battle to the enemy through offensive actions. To operate effectively in a power projection arena, a fighter needed an excellent turn rate, endurance, overland lookdown radar, quality medium and short range weapons, and self-protection avionics. [Ref. 43:pp. 103-104]

Even though many of the dual mission requirements inherent in the maritime strategy were met by the F/A-18, its relatively short range, low-power radar, and air-to-air limitations suggested a more specialized fighter was needed to conduct the outer air battle.

On 9 December, 1982, the Navy Decision Resource Board (DRB) determined that an upgrade to the F-14A, designated the F-14D, was the most cost-effective method to improve carrier battle group outer air battle effectiveness [Ref. 43:p. 11]. The F-14A aircraft, which had been in production with the same basic configuration since 1969, was rapidly becoming obsolete due to Soviet advances in bomber technology, long-range cruise missiles, and electronic countermeasures. The decision was confirmed in a SECNAV memorandum of 6 July 1983, which delineated the required performance capabilities of the upgraded F-14. Requirements included higher thrust and more reliable engines to increase tactical effectiveness against advanced threats and to correct significant operational and safety problems associated with the TF-30 engine; new avionics to incorporate DoD directed inter-operability programs; and an

upgraded radar to ensure multi-target, multi-shot capability existed in the more severe ECM environment projected for the future. [Ref. 34:pp. 1-5]

In addition to the performance requirements, Lehman's memorandum also gave guidance in the areas of schedule and cost. The acquisition schedule of the F-14D was driven by the need to get the aircraft into the field as quickly as possible due to the emerging SNA threat. The Navy's ambitious plans called for a full-scale development effort of five years, followed by fleet introduction of the new aircraft in FY 90 [Ref. 44:p. 37]. The F-14D's schedule represented a 50% reduction in the time normally required for acquisition programs during this era. Cost for the F-14D development program was capped by the SECNAV at $855M [Ref. 43:p. 7]. Within this threshold, limitations were set at $750M for the contractor and 105M for Navy in-house costs [Ref. 45:p. 11].

G. THE DEVELOPMENT OF THE F-14D

Due to the requirements imposed by the SECNAV, only one contractor, Grumman Aerospace Corporation of New York, possessed the requisite design skills and production facilities to manufacture the F-14D. In July 1984, the U.S. Navy and Grumman signed an incrementally funded, fixed price, full scale development contract for the design, development, and qualification of the F-14D. The upgrade of the F-14A to

the F-14D essentially was comprised of three elements: engine, avionics, and radar.

1. Engine

The engine upgrade involved removing the TF-30 engines manufactured by Pratt & Whitney, and replacing them with the General Electric F-110-GE-400 ATE. As previously discussed, the F-110 engine offered substantial increases in operability, safety, mission effectiveness, durability, and maintainability over the troublesome TF-30 engine.

Since the basic F-110 engine had been flight tested in the F-14A with excellent results and had undergone extensive flight testing under the Air Force development program, the Secretary of the Navy also approved an Engineering Change Proposal to install the engine in a limited number of new and retrofitted F-14A airframes [Ref. 46:p. 4]. This modification would be called the F-14A+. The requirement for the F-14A+ was necessitated by the safety and operability problems associated with the TF-30 engine.

2. Avionics

The avionics upgrade replaced the 1960's vintage analog system with a new digital system architecture. Other avionics changes included a Joint Tactical Information Distribution System (JTIDS) for secure communication and battlefield information; an advanced Self Protection Jamming System (ASPJ) and a new Radar Warning Receiver (ALR-67) for

improved defensive electronic countermeasures; and the Infra-red Search and Track (IRST) for long-range air-to-air target detection [Ref. 43:p. 11]. The F-14D also incorporated advanced control and display techniques, similar to those designed for the F/A-18, to decrease the pilot workload. One technique, called Hands on Throttle and Stick (HOTAS), allowed the pilot to perform cockpit chores without removing his hands from the primary controls [Ref. 42:p. 106]. Another, the improved Heads up Display (HUD), allowed the pilot to read his flight instruments and status display without looking down into the cockpit [Ref. 42:pp. 105-106].

3. Radar

The installation of a new AN/APG-71 radar in the F-14D offered a six-fold processing improvement over the F-14A's analog system and improved target detection and tracking capabilities in a heavy enemy electronic countermeasures environment by 40 percent [Ref. 42:p. 105].

The F-14D was designed to be a tremendous improvement over the original F-14A. The entire package of upgrades would allow the F-14D to perform its air superiority mission for the fleet well into the 21st century.

H. ACQUISITION STRATEGY

The F-14D was developed under a fixed price, not-to-exceed (NTE) contract with specific guidance from the SECNAV to avoid all possible configuration changes after program initiation.

The total buy of new F-14D aircraft was established at 304 aircraft. There were to be purchases of 7 F-14Ds in FY 88, 18 in FY 89, 30 for FY 90-97, and 39 in FY 98 [Ref. 43:p. 10]. The contract called for the first F-14D to be delivered in March 1990.

To manage the key variables of cost, schedule, and weapon system performance of the F-14D program, several of the following concepts were integrated into the acquisition strategy by the Program Manager.

1. Commonality

The F-14D program was designed to reduce cost and minimize risk by using systems that were common with other Navy and Air Force aircraft. This would allow the F-14D to benefit from development efforts which were already underway, or which had been completed by other aircraft programs. Additional benefits would also be gained in the form of reduced production and logistics support costs as a result of their commonality.

Virtually all the major systems in the F-14D had extensive commonality with other aircraft. The General Electric F-110-GE-400 engine used in the F-14D was nearly identical to the Air Force F-110-GE-100 engine used in the F-16 fighter. There was an 80% commonality of parts between the engines [Ref. 44:p. 37]. The Department of the Navy was able to greatly reduce the technical risk in the F-14D program by

selecting the derivative of an aircraft engine which had recently completed over several thousand hours of testing.

A considerable portion of the new F-14 avionics suite was common to the F/A-18, AV-8B, and A-6E aircraft. Common avionics systems included the AN/AYK-14 computer, ALR-67 radar warning receiver, AN/ALQ-165 airborne self-protection jammer, ASN-130 inertial navigation system, and a multitude of other components. The planned avionics weapon replaceable assembly (WRA) commonality with existing aircraft was over 80 percent. [Ref. 44:p. 37]

The Hughes APG-71 digital signal processing radar not only used seven of fourteen weapon replaceable assemblies from its analog AWG-9 radar derivative but also utilized many of the improvements developed for the USAF F-15 multi-stage improvement program. [Ref. 43:p. 12]

2. Concurrency

Due to the compressed acquisition cycle mandated by the SECNAV, schedule risk was considered moderate to high for the F-14D program. To ameliorate schedule risk, the Program Manager planned to concurrently develop and produce the aircraft. Not only would concurrency ensure an earlier introduction of the F-14D into the fleet but also keep the Grumman F-14 production line operating at its minimum economic efficiency rate of one aircraft per month.

3. Preplanned Product Improvement

Every major subsystem involving target acquisition, identification or targeting was purchased directly by the Navy and provided to Grumman as Government Furnished Equipment (GFE). Many of these DoD directed programs (JTIDS, ASPJ, and IRST) were still in development and posed considerable risk to the F-14D program should their development lag [Ref. 47:pp. 31-32]. To alleviate this schedule risk, the Program Manager adopted a preplanned product improvement strategy which allowed other radar/avionics objectives to be met, independent of the status of the directed programs. The F-14D aircraft would be designed and configured to incorporate these directed program improvements at a future date, if necessary.

4. Cost Reduction

The full-scale development contract with Grumman included the procurement and integration of engines, radar, and a digital avionics system as well as the integration of all GFE systems. To reduce the government's risk to cost growth, a fixed-price with economic price adjustment contract was used. Even though fixed-price contracts are normally considered too risky for high technology programs, the Navy felt the low amount of RDT&E needed combined with the sufficiency of cost control history for Grumman made the fixed-price type contract a sound choice.

By using a fixed-price contract, Grumman was obligated to deliver the terms of the contract, regardless of the actual cost. This shifted the majority of the financial risk from the Navy to Grumman. If Grumman's actual cost to deliver the aircraft was greater than the contractual price, the contractor lost money. Conversely, if Grumman's actual cost was lower than the contractual price, a profit was made. Grumman was motivated to contain cost growth within the program to obtain greater profit.

The Department of the Navy, as the major advocate for the F-14D, saw the aircraft as a low cost, high performance replacement for the F-14A in the outer air battle. As such, the acquisition program was designed to manage the key parameters of cost, schedule, and performance. Program costs during full-scale development, for example, were capped by the SECNAV. Cost reduction strategies such as the use of firm fixed-price contracts, commonality, and preplanned product improvement were also used to limit cost increases. Schedule risk was managed by the judicious use of concurrency during certain key phases of development and testing. Performance risk was reduced by the wide use of proven technology from the Air Force and other Navy programs.

I. THE F-14D IS PRESENTED TO CONGRESS

Armed with a validated mission need and approval for the F-14D aircraft's development from the OSD, the Navy requested

large scale increases in RDT&E funding from Congress for FY 85.

In devising its strategy to market the F-14D to Congress, the Navy had anticipated congressional concerns to focus on the affordability aspects of the program. Instead, deliberations in both the House and Senate focused not on the affordability of the program, but on the improved safety aspects of the program and competition.

In the HAC, Representatives Young of Florida and Addabbo of New York set the tone for deliberations on the F-14D program by focusing on the TF-30 engine.

> Mr.YOUNG. I am wondering why we don't write the engines [TF-30] off as a bad deal, sell them to somebody or scrap them, and take out the parts or put new engines in a good airplane to make the airplane reliable...when you think about losing the life of the crew, and it is a two-man crew in this airplane, I don't know, sometimes you have to take your losses and you cut and run. You [Admiral Schoultz] have confirmed the fears about the TF-30 engine that I have heard from some of your people that fly them. [Ref. 48:p. 347]

Likewise, in the SASC, the F-14D program found an advocate in Senator John Warner, the former Secretary of the Navy. Senator Warner not only highlighted the performance improvements of the F-14D engine over its TF-30 predecessor during testimony, but advocated accelerating this portion of the upgrade program.

> Senator WARNER. You have to wait until 1987 [to upgrade the engine]?

Admiral SCHOULTZ. To put them in the airplane. Hopefully they will start buying them before that. The problem is trying to get everything underneath the tent money wise. We hope to have a balanced program.

Senator WARNER. I would like to have the Secretary of the Navy provide me with a program for upgrading that airplane in a period shorter than 1987. If it is fiscal considerations, then we can address those here in the Congress. If it is conditional funding for R&D, likewise we can address that here in Congress. From my own point of view, I think it is unacceptable to have a program that was initiated back in the early seventies and still be not fulfilled here in the eighties. [Ref. 49:p. 2066]

In the Senate Defense Subcommittee on Appropriations, deliberations on the F-14D were dominated by discussion on competition, a topic which had recently been hotly debated in Congress and the acquisition community. Senator Ted Stevens, Chairman of the committee, openly questioned the Navy's methodology for selecting the F-110 engine:

Senator Stevens. The Air Force is still buying F-100s. They have not told us that they are going to stop buying F-100s. You have just selected the F-110 without any kind of competition for your use.

Admiral Schoultz. Yes, sir. We had an option to go either one, and this one fits into that aircraft very well, and does all of the things we need to do....

Senator Stevens. The Air Force has been touting very heavily to us the cost savings that have come about from their competition. Your numbers were not included in their competition. Why didn't you compete?

Admiral Busey. There were options in the Air Force competition for Navy aircraft...The Secretary's guidance to us a year ago was that we will select an engine from the Air Force competition. Therefore, the competition knew all along that the Navy was going to make a selection, and that we would not run our own competition. [Ref. 50:pp. 196-197]

Questions submitted by advocates of the F-14D such as Senator D'Amato of New York, tried to defuse the competition issue.

> Question. Please describe the provision(s) of the Air Force's request for proposal for its engine competition which put the competitors on notice that the Navy would be making its engine selection on the basis of the Air Force's competition.
>
> Answer. The USAF request for proposals did address Navy production quality options. Both the General Electric and the Pratt & Whitney proposals included acknowledgement of the RFP line item and provided not-to-exceed (NTE) priced options for the Navy engines.
>
> Question. Did the Navy receive any protests or comments concerning its decision to base its engine selection on the Air Force progress?
>
> Answer. The Navy received no formal protests nor substantive comments on its decision to base its engine selection on the Air Force competition. There was certainly full awareness of the Navy's intention to do so, based on wide circulation of the contents of the Secretary of the Navy's Memorandum dated 6 July 1983. [Ref. 50:pp. 262-263]

Congressional testimony and debate on the F-14D tended to skirt the issues of affordability during its first major discussion before Congress. Congressional advocates for the F-14D attempted to sell the safety merits of the program to their colleagues. In doing so, they hoped to equate support for the F-14D program with support for operational safety within the military. Other members of Congress, such as Senator Stevens openly questioned specific aspects of the program such as competition. In the end, the F-14D program

received the full amount of funds requested; it had passed its first major hurdle.

J. GRAMM-RUDMAN-HOLLINGS

When President Reagan entered office in 1981, he targeted a balanced budget as a key objective of his administration. Speaking on this subject, in his first inaugural address, Reagan stated:

> For decades we have piled deficit upon deficit, mortgaging our future and our children's future for the temporary convenience of the present. To continue this long trend is to guarantee tremendous social, cultural, political and economic upheavals...It is time to...get government back within its means, and to lighten our punitive tax burden. And these will be our first priorities, and on these principles, there will be no compromise. [Ref. 5:p. 72]

By 1985, however, the federal deficit had nearly tripled in amount and doubled as a percentage of Gross National Product [Ref. 5:p. 5]. In a bid to reduce the budget deficit and federal outlays, the Gramm-Rudman-Hollings(GRH) Act of 1985 was passed. The GRH Act prescribed a series of annual deficit reductions, culminating in a balanced budget by FY 91. To enforce its deficit reduction policy, the GRH Act established a sequestration process by which congressional appropriations could be superseded by automatic cutbacks if deficit targets were not met.

The GRH Act threw not just the F-14D, but the entire future of naval aviation into doubt.

> Senator Sasser. ...By the final year of Gramm-Rudman, in 1991, I see the Navy plans to increase the number of aircraft procured by 55 percent. Now how does the Navy realistically expect to achieve that goal in view of the budget trends of fewer dollars for defense?
>
> Admiral Martin. We are looking at trying to maintain, within the fiscal constraints that we have, a balanced and affordable program. Our budget that we are lying out for the 5-year defense plan is one that we think is achievable and is executable within the fiscal constraints that we have. But it is going to take a lot of moving and very careful management of our resources. [Ref. 51:p. 206]

Even though the GRH Act would later be overturned by the Supreme Court, the budgetary debates that followed GRH enactment started a trend in reduced defense spending, the impact which would be felt throughout the defense community.

K. PROGRAM RESTRUCTURING

The original acquisition strategy for the F-14D weapon system called for the production of 304 new aircraft. The changing fiscal climate caused by the GRH legislation; however, forced the SECNAV to revisit the original F-14D production objectives. On 17 September 1986, Lehman directed that procurement of new-production F-14Ds would be supplemented with the remanufacture of F-14As into F-14Ds [Ref. 52:p. 13]. This change, he hoped, would not only speed the introduction of the F-14D into the fleet but also ease fiscal problems exacerbated by decreased funding within the Future Years Defense Plan (FYDP).

On 25 November 1986, A Program Change Approval Document was signed, changing the total quantity of F-14D aircraft to be procured from 304 to 527 [Ref. 46:p. 4]. To execute Lehman's guidance in the most effective manner, the Navy cut its purchase of 304 new Grumman F-14Ds to a buy of 127 [Ref. 46:p. 4]. The Navy's new procurement schedule called for the purchase of seven F-14Ds in FY 88 and then annual procurement of 12 aircraft through 1998 [Ref. 53:p. 18]. The Navy's request for 12 new F-14Ds per year was based on the need to offset projected attrition of fleet aircraft and to maintain a minimum economic production rate at Grumman's Long Island, N.Y. facilities [Ref. 53:p. 18].

The Navy also planned to remanufacture 400 F-14As into the F-14D configuration beginning in 1990. Under the F-14D remanufacturing program, selected F-14A aircraft would be stricken administratively from the Navy's inventory and provided as government furnished material to the contractor. The remanufacture of the F-14A would include rewiring, overhaul, and service-life extension as well as the installation and integration of the new radar, avionics, and engine. The remanufactured F-14D would be identical in performance and configuration to a new-production aircraft. [Ref. 54:p. 235]

The Navy also viewed the remanufacture program as an opportunity to introduce competition into the F-14D program. This was done not only to lower the overall cost of the

program but to address criticism levied by some members of Congress during past deliberations. The acquisition strategy directed that the first lot of six aircraft would be split between Grumman and a second source. Grumman was non-competitively awarded a contract to remanufacture four aircraft with the sole purpose of developing a technical data package. The two remaining aircraft of the first lot would be remanufactured by the second source to validate the data package. To assure a wartime mobilization base, lot 2 would be equally split between Grumman and the second source. The remaining lots were to be competed between Grumman and the second source on a yearly basis. [Ref. 47:pp. 8-9]

The new procurement profile for the F-14D program, which included 127 new production aircraft and 400 remanufactured aircraft represented a 73% increase in the number of F-14Ds available for combat at an estimated 19% increase in cost versus the previous profile of 304 new production aircraft [Ref. 54:p. 235]. Lehman believed the new F-14D aircraft mix obtained the greatest warfighting capability for each year's budget and was the least costly option available for obtaining an all F-14D force.

L. THE CASE AGAINST THE F-14D

By late 1988, opposition to the F-14D program began to emerge in the Office of the Secretary of Defense (OSD). The

opposition was led by David Chu, the Assistant Secretary of Defense for Program Analysis and Evaluation (PA&E).

As Assistant Secretary for PA&E, Chu's job was to analyze the relative costs and merits of the major weapon systems purchased by DoD. The duties of the PA&E office were outlined by one former Assistant Secretary during congressional hearings.

> As the Assistant Secretary of Defense for Program Analysis and Evaluation, my main role would be to advise the Secretary of Defense on issues involving force structure, choices between alternative weapon systems, scenarios on which our planning should be based, the capabilities of alternative forces and what they cost, and similar matters of central importance in defense planning. [Ref. 55:pp. 11-12]

The influence of the PA&E office within the OSD had grown significantly during the budget-conscious years of the late 1980's. As a member of the Defense Resources and Planning Board (DRPB) and the Defense Acquisition Board (DAB), the two primary decision-making forums for the OSD, Chu was in a powerful position to influence acquisition decisions. With the defense budget continuing to decrease in terms of real growth, Chu's recommendations to cut waste and eliminate uneconomical programs gathered support.

Chu was opposed to new F-14D production. He believed that in an attempt to keep the Grumman production line open, DoD was deliberately buying aircraft in low quantities. The effect of this policy was to drive up the unit cost of each

aircraft. Chu estimated that the 12 F-14D aircraft scheduled for production in FY 89 would cost the government nearly $75 million each. This cost was three times greater than the $23 million price paid for the Navy's other carrier-based fighter, the F/A-18 Hornet. [Ref. 36:p. 4]

Chu favored the continued remanufacturing of F-14 aircraft as a cost-effective means to upgrade the fighter fleet. Remanufacturing, he believed, invested scarce dollars into areas of the F-14 which needed the most improvement: engines, radar, and avionics. With the Navy scheduled to receive an aircraft-carrier version of the Air Force's Advanced Tactical Fighter (NATF) by the year 2000, Chu also cautioned against procuring airframe life that would not be used. A newly built F-14D with an estimated 25-30 year lifespan, would be replaced by the NATF long before its airframe fatigue life had expired. A remanufactured F-14D with an expected 10-15 year lifespan; however, would phase out nicely with the arrival of NATF. [Ref. 36:p. 26]

His argument against new F-14D production was further bolstered by the Navy's own "Naval Aviation Requirements" report released in early January 1989. The report recommended that the mix of aircraft assigned to aircraft carriers be changed, with fewer F-14s on each. More significantly, the report said the F-14 was the only aircraft in surplus, an assertion that gave Chu more ammunition to attack the program. [Ref. 36:pp. 26-27]

On 9 January 1989, just prior to leaving office, President Reagan submitted his FY 90 budget to Congress. Included in his request was $1.3 billion for 12 new F-14Ds and six remanufactured F-14As [Ref. 36:p. 36]. After Bush succeeded Reagan later that month, he announced deep spending cuts and requested agencies to resubmit their FY 90 budgets. For the Department of Defense, this meant a $10 billion budget reduction.

For Chu, the budget resubmission offered a golden opportunity to kill new F-14D production. He found an ally in the Under Secretary of Defense for Acquisition and Technology (USD(A&T)), John Costello, who had also targeted low-volume purchases for termination. On 10 April 1989, the DRPB decided to kill new F-14D production. Two weeks later, the SECDEF, Richard Cheney, announced the termination decision in testimony before the HASC.

M. THE BATTLE ON CAPITOL HILL

Debate on the fate of the F-14D program now shifted to the Defense Committees of both the House and Senate. Advocates of the program, led by the New York congressional delegation, attacked the SECDEF's termination decision not from an affordability viewpoint, but one of national security. Several Congressmen argued that the decision to terminate new F-14D production essentially eliminated Grumman as an airframe manufacturer. This, they claimed, had dire consequences for

both the industrial base and the future of naval aviation competition.

> Senator D'Amato. If we eliminate the F-14D, what about competitiveness in the future as it relates to the naval needs? Are we not going to have just one source?...Mr. Chairman, I think what we are talking about is the destruction of an industrial base called Grumman that provides competitiveness at this time. This is just not a situation where we are cutting back on a plane that is not necessary; we are talking about a plane that is absolutely necessary...If the F-14D is eliminated, Grumman will no longer be able to compete as an effective force in air production. [Ref. 56:pp. 391-392]

> Senator Sasser. I just want to frankly say Senator D'Amato's statement about jeopardizing the future industrial base for Navy fighter production is persuasive to me. I fear that we are going down the path of the Navy relying on one manufacturer to meet Navy fighter needs. It has been my experience just watching the budget figures that when we start relying on solely one manufacturer the taxpayers end up paying a substantial premium for what they receive. [Ref. 56:p. 812]

Secretary Cheney, in explaining his reasoning behind the termination decision, attempted to counter these assertions.

> The greater our surge capability , the greater our ability in peacetime to have competition between competing systems - all of those things are to be valued. The problem, of course, is how much are you willing to pay for that. If you look at the F-14D decision...the new production line was operating at a rate of one a month, and the cost, ran somewhere between $51 million and $75 million per copy, to buy 12 F-14Ds a year. This is a very high price to keep a production line open. Given there are other contractors that are out there in the business...we are indeed in a position to know that we will have the industrial base we need to meet our needs in the years ahead. [Ref. 56:pp. 44-45]

Several Congressmen also challenged OSD's assertion concerning F-14 fighter excess. Data were presented by

Senator D'Amato of New York which showed shortages in naval fighter forces beginning in the 1996-97 timeframe, if new F-14D production was cut. By the year 2007, the discrepancy was expected to reach 21 percent. With a three year slippage in NATF deliveries, the shortfall would increase to 53 percent. Senator D'Amato argued that the NATF was still in the conceptual phase and that experience had shown joint Navy-Air Force aircraft developments to be disastrous. Should NATF flounder, the Navy would be left without a modern air superiority aircraft for fleet air defense. This scenario, he viewed, was an unacceptable risk to national security.

N. THE SEARCH FOR COMPROMISE

After deliberations ended on the amended Fiscal 1990 Defense Authorization Bill, the SASC and HASC took different directions on the F-14D issue. The SASC sided with the SECDEF and did not authorize funds for new F-14D production. The HASC, however, restored funding to the program. In resurrecting the F-14D, the committee expressed concern that termination of production "may be hastily conceived and premature." The committee recommended procurement of 12 new F-14Ds in FY 90 and provided advanced procurement for 12 new production aircraft the following year. [Ref. 57:p. 19]

The move to restore funds to the F-14D program by the HASC was a serious rebuke of the Secretary Cheney. Responding to the committee's decision to restore funds for the F-14D,

Cheney called the restoration "short-sighted." He believed the decision to keep the F-14D line open would cost $1 billion more than the recommended plan to remanufacture old aircraft and would also result in 30% fewer F-14Ds in the Navy's inventory. [Ref. 58:p. 15]

During joint conference between the House and Senate, a political compromise was reached. The Congress authorized another year's production of new F-14Ds (18 each) on the condition that Grumman sign an agreement stating that it would not seek further production of new F-14Ds [Ref. 59:p. 30]. This agreement, when signed by Grumman, would effectively end new F-14D production at 37 aircraft.

O. THE TERMINATION OF THE F-14D

By 1991, the demise of the Soviet Union as a superpower had forced wholesale changes in the way the Navy viewed warfare. Testifying before Congress, the SECNAV expressed the Service's vision on modernization and force structure.

> The key that makes maintaining force structure and modernization simultaneously possible is an important shift in the character of the threat we are facing. Most significantly, for our purposes, the long range air defense threat, posed by ASM carrying Backfires, Bears and Badgers is diminished primarily because the likelihood of a major confrontation with the Soviets has decreased. At the same time, the full integration of AEGIS into the fleet's air defense capabilities has improved our overall air defense posture. Unfortunately, we saw no similar change in the nature of the threat as it relates to strike warfare requirements. In fact, the opposite is true. The number of sophisticated IADS [Integrated Air Defense Systems] and associated weapons in the third world are

> growing. The analysis led us to conclude that we could afford to put less effort into AAW [Air-to-Air Warfare] and modernize plans in the strike warfare area. [Ref. 60:p. 509]

On 26 February 1991, Secretary Cheney terminated the Grumman F-14D remanufacturing program for the convenience of the government. The Navy also ordered General Electric to end production of 24 F-110 engines and spares for previously designated aircraft conversion. A cancellation notice also went out to Hughes which supplied the AN/APG-71 radar for the F-14D model. [Ref. 61:p. 71]

The main reason all production on the F-14D was ordered terminated was revealed a few days later when DoD announced that it wanted the Navy to develop and buy new versions of the F/A-18, the F/A-18 E/F. The decision to procure the F/A-18 E/F was questioned by many within the Navy and was openly criticized by former SECNAV Lehman who viewed the F/A-18 as lacking the range and payload required to perform the deep strike mission or to provide extended range fleet air defense. F/A-18 proponents countered these criticisms by highlighting the Hornet's superior reliability, maintainability, survivability, and foreign military sales potential compared to the F-14. The Navy's decision to go with the F/A-18 E/F aircraft vice the F-14D was driven economically by OSD's decision to cut aircraft funding by nearly half in the FYDP. The procurement of the F/A-18 E/F would allow the Navy to

maintain its projected force structure during future downsizing. [Ref. 62:p. 25]

Grumman offered the Pentagon long term price guarantees, in April of 1991, on the F-14D and F-14 derivatives in an attempt to get the aircraft into the FY 92 Budget. In a letter to Cheney, the Grumman Aerospace Corporation Chairman, Renso Corporali, attempted to price competitively the F-14 against the F/A-18 E/F. He also committed Grumman to broad development of the F-14D Quick Strike, an F-14D derivative with added air-to-ground attack capabilities. Corporali's offer was seen as a last ditch effort on the part of Grumman to reopen the partially closed F-14 production line. [Ref. 63:p. 24]

Although the proposal sounded promising, Navy officials questioned whether Grumman would be able to hold to its stated rates and prices. In the end, the proposal was rejected by DoD. This effectively signalled the end of Grumman's F-14D program.

V. ANALYSIS AND CONCLUSION

A. INTRODUCTION

Decisions on major weapon systems programs are complex and inherently controversial because they involve the security of the nation, large budgets, and organizational missions. The F-14 upgrade program was marked by four major decisions. The first was the 1984 Navy decision to upgrade the F-14A to the F-14D. The F-14D included higher thrust, more reliable engines, state of the art Navy standardized digital electronics, upgraded avionics, and upgraded radar. The entire package of upgrades would allow the F-14D to effectively perform its outer air battle mission for the fleet.

Secretary Lehman's decision to restructure the F-14D program was the second major decision. The restructuring reduced the Navy's planned purchase of 304 new Grumman F-14Ds to a buy of 127 and initiated a remanufacture program to convert 400 F-14As into the F-14D configuration.

Secretary Cheney's decision to halt new F-14D production was the third and most controversial decision. It marked the first widespread disagreement among the major acquisition participants on the direction of the F-14D program. The

decision was temporarily reversed through negotiation and compromise in Congress.

The fourth major decision, the termination of the remanufacture program, was made during the middle of the Gulf War by Cheney, a more experienced, popular, Secretary of Defense, who was at the height of power. With the exception of the New York congressional delegation, this decision went unchallenged and effectively ended the F-14 upgrade program.

This chapter analyzes the organizational and political factors involved in each of these decisions through the use of Allison's Bureaucratic Politics Model of Decision-making. Allison's model provides a useful framework for understanding the actions and motivations of institutional and political actors as they carried out their roles in the acquisition process.

B. ALLISON'S BUREAUCRATIC POLITICS MODEL

The Bureaucratic Politics Model was one of three models developed by Graham T. Allison, a professor of politics at Harvard, to explain decision-making during the Cuban Missile Crisis. Even though his focus was on foreign policy decision-making, Allison's model can be used to analyze government decisions about the military, including weapons procurement decisions.

The model says that many actors who are positioned hierarchically within the government make decisions based on

bargaining. These leaders, who have ascended to the top of the bureaucratic apparatus, share power within the Government. Because of enduring differences among individuals on most issues, decisions are resolved politically. In this model, decisions, structures, and policies emerge from an ongoing process of bargaining and negotiation among key individuals and coalitions.

C. DECISION 1 - PROGRAM INITIATION

The impetus for the upgrade to the F-14 came from the then Secretary of the Navy, John Lehman. Prior to Lehman's arrival, support for an F-14 upgrade had been weak. Money for an engine upgrade, for example, had been diverted to the F/A-18 program. Likewise, development of the F-14's air-to-ground capability had been blocked by the lightweight fighter lobby.

As an advocate for the F-14 upgrade program, Lehman sought approval from the other two key participants in the acquisition process, OSD and Congress. From OSD, Lehman sought budgetary approval and integration of his budget request into the administration's military, economic, and policy goals. From Congress, Lehman sought broad political support and continued funding. The primary means used by the Navy to gain support for the F-14D upgrade was through program design.

The Department of the Navy saw the F-14D as a low cost, high performance replacement for the F-14A in the outer air

battle. As such, the F-14D upgrade acquisition program was designed to manage the key parameters of cost, schedule, and performance. Program costs during full-scale development, for example, were capped by the SECNAV. Cost reduction strategies such as the use of fixed-price type contracts, commonality, and preplanned product improvement were also used to limit cost growth. Schedule risk was managed by the judicious use of concurrency during certain key phases of development and testing. Performance risk was reduced by the wide use of proven technology from the Air Force and other Navy programs.

In devising its strategy to market the F-14D to Congress, the Navy had anticipated congressional concerns to focus on the affordability aspects of the program. Instead, deliberations in both the House and Senate focused on competition, a topic which had recently been hotly debated in Congress and the acquisition community.

Even though the debate on competition never seriously challenged support for the F-14D upgrade, events of the following year would force the Navy to address directly the competition issue.

D. DECISION 2 - PROGRAM RESTRUCTURE

In 1985, the Gramm-Rudman-Hollings(GRH) Act was passed to reduce the budget deficit and federal outlays. The GRH Act prescribed a series of annual deficit reductions, culminating in a balanced budget by FY 91. To enforce its deficit

reduction policy, the GRH Act established a sequestration process by which congressional appropriations could be superseded by automatic cutbacks if deficit targets were not met.

The deficit reduction climate caused by GRH elevated weapon systems affordability to the top of most political agendas. For defense acquisition programs, this meant increased scrutiny of program structure and justification by both OSD and Congress.

Secretary Lehman responded to the changing fiscal climate caused by GRH by restructuring the F-14D program. The restructuring reduced the Navy's planned purchase of 304 new Grumman F-14Ds to a buy of 127 and initiated a remanufacture program to convert 400 F-14As into the F-14D configuration.

In restructuring the F-14D program, Lehman created a "win" situation for all of the major acquisition participants. For Congress, the restructured program represented substantial cuts in new-production aircraft by the Navy and symbolized a commitment to deficit reduction. For OSD, the restructured program not only accelerated the introduction of the F-14D into the fleet but also eased fiscal problems exacerbated by decreasing funding within the FYDP. The Navy benefitted by obtaining an all F-14D force. The new procurement profile for the F-14D program, which included 127 new production aircraft and 400 remanufactured aircraft represented a 73% increase in the number of F-14Ds available for combat. The Navy also

viewed the remanufacture program as an opportunity to introduce competition into the F-14D program. This was done not only to lower the overall cost of the program but to address criticism levied by some members of Congress during past deliberations.

To offset potential opposition by the New York congressional delegation to new-production cuts, the Navy requested 12 new F-14Ds per year through 1998. This amount of aircraft would ensure the production line at Grumman's Long Island, N.Y. facility remained open. Keeping the production line open at Grumman not only preserved jobs, but allowed the company to continue development and planning of its proposed next-generation fighter, the Tomcat 21. If the F-14D production line was closed, Grumman could be forced out of the aircraft business and the Tomcat 21 would never be built.

E. DECISION 3 - PRODUCTION TERMINATION

On 9 January 1989, just prior to leaving office, President Reagan submitted his FY 90 budget to Congress. Included in his request was $1.3 Billion for 12 new F-14Ds and six remanufactured F-14As. After Bush succeeded Reagan later that month, he announced deep spending cuts and requested agencies to resubmit their FY 90 budgets. For the DoD this meant a $10 billion budget reduction.

For David Chu, the Assistant Secretary for PA&E, the budget resubmission offered a golden opportunity to kill new

F-14D production. Chu was opposed to new F-14D production for several reasons. He believed that the unit cost of the F-14D was too high because DoD was deliberately buying aircraft in low quantities to keep the Grumman production line open. Chu also believed remanufacturing was a better alternative to new aircraft production because it invested scarce dollars into areas of the F-14 which needed the most improvement. With the Navy scheduled to receive an aircraft-carrier version of the Air Force's Advanced Tactical Fighter (NATF) by the year 2000, Chu also cautioned against procuring airframe life that would not be used.

Chu found an ally in the Under Secretary of Defense for Acquisition and Technology (USD(A&T)), John Costello, who had also targeted low-volume purchases for termination. On 10 April 1989, the DPRB decided to kill new F-14D production. Two weeks later, the SECDEF, Richard Cheney, announced the termination decision in testimony before the HASC.

Cheney's decision to cancel new F-14D production was met by stiff resistance in Congress. Advocates of the program, led by the New York congressional delegation, attacked the SECDEF's termination decision not from an affordability viewpoint, but one of national security. Several Congressmen argued that the decision to terminate new F-14D production essentially eliminated Grumman as an airframe manufacture. This, they claimed, had dire consequences for both the industrial base and the future of naval aviation competition.

Several Congressmen also challenged OSD's assertion concerning F-14 fighter excess. Data were presented by Senator D'Amato of New York which showed shortages in naval fighter forces beginning in the 1996-97 timeframe, if new F-14D production was cut. This scenario, he viewed, was an unacceptable risk to national security.

After joint conference deliberation on the FY 90 Defense Authorization Bill, a compromise was reached between the House and Senate. The Congress authorized another year's production of new F-14Ds despite Cheney's decision to cancel the program.

Why was SECDEF Cheney unsuccessful in his bid to cancel new F-14D production? Allison's model would suggest that he failed to build a coalition which would ensure his decision was accepted. An examination of the events surrounding Cheney's decision tend to support this.

From a political standpoint, Cheney's decision to cancel F-14D production may have been premature. When Cheney was sworn into office on 17 May 1989, he immediately faced the prospect of having to make unpopular cuts to reshape the defense budget to meet Bush's fiscal guidelines. For advice, Cheney turned to Chu and Costello, both whom recommended termination of the F-14D program. They supported their argument against the F-14D strictly from a rational-analytical approach. Their method of analysis focused on optimizing defense spending without regard to the political circumstances surrounding the decision. Since consensus building was not

important, OSD did not consult the Navy on the termination decision. As a result, the Service not only rebutted OSD's decision to cancel the program but also provided lackluster support for OSD's decision during congressional hearings.

Advocates of the F-14D program, on the opposite spectrum, were able to build a powerful coalition, especially in the House, to block Secretary Cheney's decision. Representative Downey of New York wielded great influence with the heads of the HASC and HAC. As a former member of the HASC, Downey had been instrumental in overturning the seniority-based system of electing the chairman of the committee. In 1985, he had been the catalyst behind Aspin's election as chairman. As a current member of the House Ways & Means Committee's trade subcommittee, Downey was also in a position to help the chairman of the HAC, John Murtha.

Downey's trade subcommittee voted annually on the lifting of steel import restrictions against Japan. Passage of this legislation would greatly hurt Murtha's Pennsylvania constituency which heavily depended on the steel industry.

The decision by Congress to fund the F-14D program despite OSD's request for termination, granted a temporary reprieve to the Grumman Corporation. Even though it had signed an agreement promising not to seek future new F-14D production, Grumman actively stepped up its lobbying campaign to push the F-14D. In 1990, proponents of the F-14D had convinced the SECNAV, H. Lawrence Garrett, of the need for the aircraft. In

December of that year, Garrett appeared before Congress and made a strong appeal for 132 new production F-14Ds.

F. DECISION 4 - REMANUFACTURE TERMINATION

By 1991, the demise of the Soviet Union as a superpower had forced wholesale changes in the way the Navy viewed warfare and substantially undercut the rationale for the F-14D program. On 26 February 1991, Secretary Cheney announced the termination of the remanufacture program.

The decision to terminate the remanufacture program was once again met with resistance in Congress by proponents of the F-14D. The House considered the request to terminate the program but instead chose to authorize and fund the remanufacture of an additional 19 aircraft. The HASC also authorized $50 million to initiate development of the F-14 Quickstrike aircraft which would exploit the F-14's air-to-ground potential.

Even though the F-14 coalition was strong, it lacked the support of several strong congressional leaders. During joint committee hearings in November 1991, the F-14D program was officially terminated by Congress.

Secretary Cheney was successful in implementing his decision to terminate the F-14D program because he was able to weaken and split the F-14D coalition and build strong support for his decision. He did this by seeking approval and backing from the Navy's lightweight fighter lobby by offering the

F/A-18 E/F as an alternative to the F-14D. This exploited the traditional rift between the strike-fighter and air superiority communities. Cheney also found new allies in Congress from congressional leaders who would benefit from F/A-18 E/F development.

His strategy also kept Congress focused on the technical and affordability merits of the programs vice making it a national security issue. Debate on the F-14D program in Congress often centered on comparing capabilities and cost-effectiveness to the F/A-18 E/F. The main issues which had dominated congressional debates in 1989, competition and industrial base, were rarely discussed in 1991.

G. CONCLUSIONS

The following conclusions were developed as a result of the research effort.

There is no clear distinction between policy formulation and policy implementation.

Policy formulation and implementation are intertwined because Congress requires annual review of previously approved authorization and appropriations. Most programs are revisited every year in briefings and testimony to legislators and staff. Few decisions to proceed with program development are final.

As the defense budget shrinks, weapon systems acquisition program formulation and execution becomes much larger than the manipulation of cost, schedule, and performance.

The Navy is both the initiator and executor of weapon systems acquisition programs. This characterization yields a measure of autonomy, but the Navy still must seek assistance from other acquisition participants to bring its acquisition strategy to fruition. From the OSD, it receives formal budget approval and integration of its budget request into the administration's military, economic, and policy goals. From Congress, the Navy receives broad political support and continued funding. The Service, therefore, must define, defend, and execute weapon systems acquisition programs in such a manner that it achieves the desired outcomes of all major parties.

Congressional criticism of weapon systems acquisition programs is often the result of power struggles among individuals or coalitions.

Some members of Congress advance their own agendas at the expense of weapon systems acquisition programs. The Program Manager must try to determine the underlying basis for the criticism when it occurs. Criticism should never be taken lightly. What may seem like a minute or insignificant problem can easily be taken out of context and blown out of proportion. Knowledge of where a Congressman stands on an

issue is key because it allows the Program Manager to tailor his response to address the concerns of the critic.

Weapon systems programs normally do not stand solely on their own technical merits.

Strong technical justification for a weapon system program must be aligned with a political strategy to garner congressional support and funding. A political strategy, for example, may include addressing congressional concerns over affordability, waste, competition, and the industrial base.

To understand the dynamics behind policy formulation and implementation, it is necessary to understand the environment in which decisions are made.

The environment in which defense acquisition occurs is shaped, in large measure, by the roles, objectives, and perspectives of its major participants. For DoD and OSD, acquisition programs are initiated to correct warfighting deficiencies to fulfill a mission need. Since resources are constrained, programs not only have to offer high performance, but must also be affordable and cost-effective. These requirements lead to program formulation and implementation strategies which are designed to prevent programmatic dysfunction.

For Congress, the acquisition process encompasses more than the buying of a weapon to fulfill a mission need. Congress satisfies various socio-economic-political policies through the acquisition process. As a result, increased costs

and inefficiencies often occur. The dichotomy which exists between Congress and DoD often leads to instability in the acquisition process.

Decisions affecting the survival of weapon system programs will continue to be affected by factors external to the program.

Factors external to the weapon systems program such as the budgetary and economic climate, external threat, and political conditions are constantly changing and can significantly affect that acquisition program. Program Managers must constantly monitor and evaluate risks in the external environment. Knowledge about the political and legal environment within which the program exists, will allow a Program Manager to refocus his program's direction if necessary.

APPENDIX A

TOMCAT MODIFICATION CASE STUDY

A. BIRTH OF THE F-14A

Battles fought in the Pacific Theater during World War II demonstrated the strategic importance of naval maritime force projection. Dominant naval forces were able to establish their own lines of communication (LOC), disrupt or sever the enemy's LOC, choose the time and place of offensive action, and, most importantly, carry the war to the enemy's homeland.

By the end of the war, airpower had become the dominant factor in the Pacific Theater. Naval battles were no longer fought between surface combatants, but at extended range by aircraft launched from opposing carriers or nearby islands. As a result of changing naval tactics, the battleship soon became obsolete, and the Aircraft Carrier Battle Group (CVBG) rose to become the linchpin of U.S. Naval force projection.

By the late 1950's, the U.S. Navy had over 50 aircraft carriers in service [Ref. 1:p. 24]. The large number of aircraft carriers in the U.S. Navy did not go unnoticed by the Soviet Union. As Cold War tensions increased, the Soviet Naval Aviation (SNA) incorporated the use of long-range bombers into its maritime strategy. More significantly, the Soviets were on the verge of producing offensive air-to-

surface cruise missiles capable of hitting targets up to 150 miles away [Ref. 2:p. 2]. Soviet bombers, armed with these stand-off cruise missiles, could attack U.S. aircraft carriers prior to engagement by conventional fighters.

The expanding Soviet bomber force, along with the growing cruise missile capability, was becoming more than the current F-4 fighter could defend against. Naval strategists recognized the shortcomings of the F-4 and began planning for a new, long-range fleet air defense fighter. The Navy required an aircraft that could carry a large quantity of air-to-air missiles, have the endurance to remain on combat air patrol for several hours, and was capable of defeating Soviet bombers before they could launch their missiles at the American carriers. [Ref. 3:pp. 10-15]

The Navy's first two attempts at developing an aircraft to meet the requisite features of its next fighter were unsuccessful. The first proposed candidate, the Douglas F-6D Missileer, lacked versatility and was canceled by the Eisenhower Administration in 1960. The second candidate aircraft, the Grumman F-111B, was a naval variant of the General Dynamic F-111 strike aircraft. The F-111B was built to carry the AWG-9 intercept radar and the AIM-54 Phoenix long-range air-to-air missile which was capable of destroying enemy bombers before they came within range of the fleet. After experiencing numerous performance and weight growth

problems, the F-111B was deemed unsuitable for carrier operations. [Ref. 4:pp. 1-5]

As Department of the Navy and congressional support waned for the F-111B, Grumman proactively submitted an unsolicited proposal, Design 303, as an alternative to the F-111B. This new design proposal would incorporate the F-111's engines, weapon system, and variable sweep wing concept and place them on a more capable airframe. This design would later become known as the F-14 Tomcat. [Ref. 4:pp. 3-5]

B. PROCUREMENT PLAN

On January 14, 1969, only six months after the formal cancellation of the F-111B program, Grumman Aerospace Corporation was awarded a contract to build the F-14 as the Navy's next air superiority aircraft. The Navy negotiated separate contracts with Hughes Aircraft for the avionics systems and Pratt & Whitney for the engines. These two major items would be provided to Grumman as Government Furnished Equipment (GFE). [Ref. 4:p. 9]

In retrospect, the most significant element of the F-14 contract was its engines. The F-14 was designed around the Advanced Technology Engine which would not be available in time for initial production. In order to get the aircraft quickly to the fleet, the Naval Air Systems Command sanctioned a modified version of the F-111B engine for use in the Tomcat. This engine, the TF-30-P-412, would be installed in only the

first 67 F-14's until Pratt & Whitney delivered its new Advanced Technology Engine in 1970 [Ref. 5:p. 1]. These aircraft would be designated as F-14A's.

At the end of the F-14A production cycle, it was assumed the new F-401 ATE would be ready. Plans called for 643 more aircraft to be produced with the new engine [Ref. 6:p. 1]. These aircraft would be the F-14B model. Later plans called for a F-14C model with improved avionics.

Pratt and Whitney was unable to deliver the F-401 ATE in 1970. As state of the art technology, the F-401 ATE developed problems in the areas of reliability, endurance, and ability to withstand rapid throttle movement. By 1971, the Office of the Secretary of Defense had reduced the planned number of F-14s to 301 because of technical problems and cost overrun in the F-401 ATE program. [Ref. 6:p. 2]

As problems continued to mount for the Advanced Technology Engine, the Navy continued to push back the expected delivery date for the F-401 ATE. Eventually, the Navy concluded that the cost of bringing the F-401 ATE to an acceptable level of reliability and performance was prohibitive. In March of 1974, the Navy decided to terminate the F-401 ATE program. When the F-401 ATE program died, so did the F-14B and F-14C follow-on programs. [Ref. 6:p. 3]

The decision to cancel the F-401 ATE meant that all future production lots of the F-14 would be equipped with the older, less satisfactory TF-30 engine. The Pratt & Whitney TF-30

engine had many faults which hindered the performance of the F-14. The engine was underpowered and lacked the thrust necessary to launch the aircraft from its carrier or to respond rapidly in aerial combat. The F-14A had to depend on an afterburner attached to the tailpipe of the engine to increase its power or thrust. Not only did afterburners add unnecessary weight to the aircraft, but its use also consumed large amounts of scarce fuel. Continued use of the aircraft's afterburner significantly increased the risk of engine compressor stall. [Ref. 1:pp. 38-39]

The TF-30 engine had poor throttle response and very small stall margin which made carrier landings both difficult and precarious. The reliability and maintainability of the engine was extremely poor. For every hour of flying time, Naval Air System Command estimated the fighter required about 49 man-hours of maintenance work [Ref. 7:p. 30]. Failure in the fan sections of the engine caused in-flight fires which resulted in the loss of several aircraft [Ref. 8:p. 1]. To address its continued concerns with the TF-30 engine, the Navy instituted the F-14 Survivability Improvement Program to examine the F-14's engine reliability problem.

Even though several improvements were made by the engine manufacturer to correct safety shortcomings of the TF-30 engine, a permanent solution to remedy the F-14 engine deficiency was stalled. Studies undertaken in the late 1970's to provide the F-14 with its true design thrust engine went

nowhere because of the emergence of a new internal threat, the lightweight fighter lobby.

C. LIGHTWEIGHT FIGHTER LOBBY

By the early 1970's, the high cost of the F-14A and its Phoenix weapon system had convinced many legislators that a large inventory of smaller, less expensive aircraft would better meet national defense needs. These legislators, led by Senator William Proxmire of Wisconsin and Senator Symington, the former Secretary of the Air Force, felt they had a better plan for the future of military aviation and set out to advance their case for a new lightweight fighter. In September 1973, The Senate Armed Services Committee gave its guidance to the Department of the Navy on this issue:

> The committee believes the Navy should examine the potential of a completely new aircraft as a possible alternative to the F-14 in the out-years. The Navy should obtain proposals to determine if a smaller and presumably cheaper aircraft can be designed to serve as an air superiority fighter to complement the F-14. Once this determination has been made, the committee desires to receive the Navy determination, including the costs of such alternatives as well as a technical evaluation. [Ref. 9:p. 31]

The Navy's response to this guidance was the formation of a study group to examine the potential of a lightweight fighter to be the F-14 complement.

Navy Fighter Study IV was the final product of this groups review of issues facing naval aviation. One of the most

important findings of the study highlighted the need for a multi-mission aircraft possessing both fighter and long-range strike capability [Ref. 10:p. 31]. The need for a multi-mission aircraft was driven not as much by need as it was by future affordability concerns. The escalating cost of modern weaponry had seemingly numbered the days of specialized aircraft.

In 1974, The Navy sought proposals from the aircraft industry for a new lightweight multi-mission fighter aircraft. Congress intervened in the acquisition process and directed the Navy to investigate versions of the General Dynamics YF-16 and Northrop YF-17 lightweight fighter prototypes, then under evaluation by the U.S. Air Force. [Ref. 10:pp. 32-36]

The Navy concluded that the General Dynamics design based on the F-16 was unsuitable for carrier operations. In the interim, McDonnell Douglas, with its expertise in building aircraft for the Navy, had teamed with Northrop to build the F/A-18 aircraft based on the Northrop YF-17 design. [Ref. 1:p. 54] This aircraft, with minor modifications to its engines, fit the requirements sought by the Navy. The F/A-18 aircraft was selected by the Navy as its premier strike fighter aircraft. McDonnell Douglas would be the prime contractor and Northrop, the associate. The F/A-18 had unusually strong support from several Congressmen who felt responsible for its inception. Leading the congressional support for the F/A-18

was Senator Symington, whose district in Missouri included the McDonnell-Douglas corporate headquarters. [Ref. 10:pp. 32-36]

The lightweight fighter lobby within the Department of the Navy considered the F-14 a potential threat to the existence of the F/A-18. Navy actions implied that no improvements to the F-14 could be made which might make the F/A-18 look unnecessary, inefficient, or too costly for the capability provided. Continued development of the F-14 beyond its initial configuration model was significantly curtailed. Money for engine upgrades and the development of the F-14 air-to-ground capability was diverted to the F/A-18 program. Since the F/A-18 was the designated strike-fighter for the Navy, the Service went as far as to discourage F-14 contractors from distributing photographs of their aircraft carrying air-to-ground ordnance. [Ref. 1:p. 55]

The paucity of funds to perform much needed upgrades to the F-14A would continue for several years. It was not until FY 77 that Congress would authorize money to conduct research and development for a new F-14 engine [Ref. 11:p. 1]. By this date, at least six aircraft had been lost directly due to engine problems [Ref. 12:pp. 9-15]

D. THE F-110 ADVANCE TECHNOLOGY ENGINE

The F-14 procurement plan had originally called for limited production of the F-14A, followed by extensive production of the F-14B, with improved engines. A version

designated F-14C had also been envisioned as a follow-on in the late 1970's. It was to have improved avionics, radar and fire control systems, but this program died in the conceptual stages along with the F-401 engine and the F-14B. [Ref. 5:p. 2]

The breakthrough for a new fighter engine for the F-14A came with the development of the General Electric F101 Derivative Fighter Engine (DFE) originally designed as a replacement for the U.S. Air Force F-15 and F-16 fighters. A naval version of this engine, the GE F110-400, would finally provide the F-14 with many of the critical features it had been missing.

The General Electric F-110-GE-400 Advanced Technology Engine was able to produce over 27,100 pounds of thrust, a 30% increase in combat rated thrust over the TF-30 engine [Ref. 1:p. 42]. Use of the new engine eliminated the need for afterburners on catapult launches. Fuel savings increased time on station for combat air patrol missions by 34%. This translated into an estimated 31 minutes of combat air patrol loiter time at 150 nautical miles(nm) or a patrol radius extension of 114nm [Ref. 1:p. 42]. The F-110 engine had no restriction for angle of attack operations and was able to increase the speed and acceleration of the aircraft throughout its flight envelope. Throttle restrictions were eliminated as were bothersome engine compressor stalls which haunted the TF-30 engine. With the F-110, the Navy had finally found an

engine to make the F-14 the total air superiority fighter it was envisioned to be.

E. THE NEED FOR A NEW FIGHTER

The crucial impetus for the first major upgrade to the F-14 would finally come in the early 1980's, from the new Secretary of the Navy, John Lehman. Considered acerbic and overly ambitious, Lehman was nonetheless both a skilled politician and staunch proponent of naval power.

As Secretary of the Navy, Lehman pushed a maritime strategy agenda which was predominately offensive in nature. He believed that the reason we had a Navy was to fight the Soviets, offensively, by assembling and sending carriers forward. During the initial phase of maritime strategy execution known as "seizing the initiative", carrier battle groups (CVBG) would establish sanctuaries to conduct operations. The predominant fighter mission during this phase was defending the CVGB and other maritime assets from Soviet airborne threats, such as bombers and cruise missiles. For a fighter to be effective in this environment, it required endurance, supersonic performance, a powerful radar, extremely sophisticated avionics, and multi-shot weapon capability. [Ref. 14:p. 103]

During follow-on phases of the maritime strategy, power projection strike support became the dominant fighter mission. Here, the fighter was required to defeat sophisticated enemy

air defense threats and take the battle to the enemy through offensive actions. To operate effectively in a power projection arena, a fighter needed an excellent turn rate, endurance, overland lookdown radar, quality medium and short range weapons, and self-protection avionics. [Ref. 14:pp. 103-104]

Even though many of the dual mission requirements inherent in the maritime strategy were met by the F/A-18, its relatively short range, low-power radar, and air-to-air limitations suggested a more specialized fighter was needed to conduct the outer air battle.

On 9 December, 1982, the Navy Decision Resource Board (DRB) determined that an upgrade to the F-14A, designated the F-14D, was the most cost-effective method to improve carrier battle group outer air battle effectiveness [Ref. 14:p. 11]. The F-14A aircraft, which had been in production with the same basic configuration since 1969, was rapidly becoming obsolete due to Soviet advances in bomber technology, long-range cruise missiles, and electronic countermeasures. The decision was confirmed in a Secretary of the Navy (SECNAV) memorandum of 6 July 1983, which delineated the required performance capabilities of the upgraded F-14. Requirements included higher thrust and more reliable engines to increase tactical effectiveness against advanced threats and to correct significant operational and safety problems associated with the TF-30 engine; new avionics to incorporate Department of

Defense directed inter-operability programs; and an upgraded radar to ensure multi-target, multi-shot capability existed in the more severe ECM environment projected for the future. [Ref. 5:pp. 1-5]

In addition to the performance requirements, Lehman's memorandum also gave guidance in the areas of schedule and cost. The acquisition schedule of the F-14D was driven by the need to get the aircraft into the field as quickly as possible due to the emerging Soviet Naval Aviation threat. The Navy's ambitious plans called for a full-scale development effort of five years, followed by fleet introduction of the new aircraft in Fiscal Year 1990 [Ref. 15:p. 37]. The F-14D's schedule represented a 50% reduction in the time normally required for acquisition programs during this era. Cost for the F-14D development program was capped by the Secretary of the Navy at $855M [Ref. 14:p. 7] Within this threshold, limitations were set at $750M for the contractor and 105M for Navy in-house costs [Ref. 16:p. 11]

F. THE DEVELOPMENT OF THE F-14D

Due to the requirements imposed by the Secretary of the Navy, only one viable contractor, Grumman Aerospace Corporation of New York, possessed the requisite design skills and production facilities to manufacture the F-14D. In July 1984, the U.S. Navy and Grumman signed an incrementally funded fixed price full scale development contract for the design,

development, and qualification of the F-14D. The upgrade of the F-14A to the F-14D essentially was comprised of three elements: engine, avionics, and radar.

1. Engine

The engine upgrade involved removing the TF-30 engines manufactured by Pratt & Whitney, and replacing them with the General Electric F-110-GE-400 Advanced Technology Engine. As previously discussed, the F-110 engine offered substantial increases in operability, safety, mission effectiveness, durability, and maintainability over the troublesome TF-30 engine.

Since the basic F-110 engine had been flight tested in the F-14A with excellent results and had undergone extensive flight testing under the Air Force development program, the Secretary of the Navy also approved an Engineering Change Proposal to install the engine in a limited number of new and retrofitted F-14A airframes [Ref. 17:p. 4]. This modification would be called the F-14A+. The requirement for the F-14A+ was necessitated by the safety and operability problems associated with the TF-30 engine.

2. Avionics

The avionics upgrade replaced the 1960's vintage analog system with a new digital system architecture. Other avionics changes included a Joint Tactical Information Distribution System (JTIDS) for secure communication and

battlefield information; an advanced Self Protection Jamming System (ASPJ) and a new Radar Warning Receiver (ALR-67) for improved defensive electronic countermeasures; and the Infrared Search and Track (IRST) for long-range air-to-air target detection [Ref. 14:p. 11]. The F-14D also incorporated advanced control and display techniques, similar to those designed for the F/A-18, to decrease the pilot workload. One technique, called Hands on Throttle and Stick (HOTAS), allowed the pilot to perform cockpit chores without removing his hands from the primary controls [Ref. 13:p. 106]. Another, the improved Heads up Display (HUD), allowed the pilot to read his flight instruments and status display without looking down into the cockpit [Ref. 13:pp. 105-106].

3. Radar

The installation of a new AN/APG-71 radar in the F-14D offered a six-fold processing improvement over the F-14A's analog system and improved target detection and tracking capabilities in a heavy enemy electronic countermeasures environment by 40 percent [Ref. 13:p. 105].

The F-14D was designed to be a tremendous improvement over the original F-14A. The entire package of upgrades would allow the F-14D to perform its air superiority mission for the fleet well into the 21st century.

G. ACQUISITION STRATEGY

The F-14D was developed under a fixed price, not-to-exceed (NTE) contract with specific guidance from the Secretary of the Navy to avoid all possible configuration changes after program initiation. The total buy of new F-14D aircraft was established at 304 aircraft. There were to be purchases of 7 F-14Ds in Fiscal Year (FY) 1988, 18 in FY89, 30 for FY 90-97, and 39 in FY98 [Ref. 14:p. 10]. The contact called for the first F-14D to be delivered in March 1990.

To manage the key variables of cost, schedule, and weapon system performance of the F-14D program, several of the following concepts were integrated into the acquisition strategy by the Program Manager.

1. Commonality

The F-14D program was designed to reduce cost and minimize risk by using systems that were common with other Navy and Air Force aircraft. This would allow the F-14D to benefit from development efforts which were already underway, or which had been completed by other aircraft programs. Additional benefits would also be gained in the form of reduced production and logistics support costs as a result of their commonality.

Virtually all the major systems in the F-14D had extensive commonality with other aircraft. The General Electric F-110-GE-400 engine used in the F-14D was nearly

identical to the Air Force F-110-GE-100 engine used in the F-16 fighter. There was an 80% commonality of parts between the engines [Ref. 15:p. 37]. The Department of the Navy was able to greatly reduce the technical risk in the F-14D program by selecting the derivative of an aircraft engine which had recently completed over several thousand hours of testing.

A considerable portion of the new F-14 avionics suite was common to the F/A-18, AV-8B, and A-6E aircraft. Common avionics systems included the AN/AYK-14 computer, ALR-67 radar warning receiver, AN/ALQ-165 airborne self-protection jammer, ASN-130 inertial navigation system, and a multitude of other components. The planned avionics weapon replaceable assembly (WRA) commonality with existing aircraft was over 80 percent. [Ref. 15:p. 37]

The Hughes APG-71 digital signal processing radar not only used seven of fourteen weapon replaceable assemblies from its analog AWG-9 radar derivative but also utilized many of the improvements developed for the USAF F-15 multi-stage improvement program. [Ref. 14:p. 12]

2. Concurrency

Due to the compressed acquisition cycle mandated by the Secretary of the Navy, schedule risk was considered moderate to high for the F-14D program. To ameliorate schedule risk, the Program Manager planned to concurrently develop and produce the aircraft. Not only would concurrency

ensure an earlier introduction of the F-14D into the fleet but also keep the Grumman F-14 production line operating at its minimum economic efficiency rate of one aircraft per month.

3. Preplanned Product Improvement

Every major subsystem involving target acquisition, identification or targeting was purchased directly by the Navy and provided to Grumman as Government Furnished Equipment (GFE). Many of these Department of Defense directed programs (JTIDS, ASPJ, and IRST) were still in development and posed considerable risk to the F-14D program should their development lag [Ref. 18:pp. 31-32]. To alleviate this schedule risk, the Program Manager adopted a preplanned product improvement strategy which allowed other radar/avionics objectives to be met, independent of the status of the directed programs. The F-14D aircraft would be designed and configured to incorporate these directed program improvements at a future date, if necessary.

4. Cost Reduction

The full-scale development contract with Grumman included the procurement and integration of engines, radar, and a digital avionics system as well as the integration of all GFE systems. To reduce the government's risk to cost growth, a fixed-price with economic price adjustment contract was used. Even though fixed-price contracts are normally considered too risky for high technology programs, the Navy

felt the low amount of RDT&E needed combined with the sufficiency of cost control history for Grumman made the fixed-price type contract a sound choice.

By using a fixed-price contract, Grumman was obligated to deliver the terms of the contract, regardless of the actual cost. This shifted the majority of the financial risk from the Navy to Grumman. If Grumman's actual cost to deliver the aircraft was greater than the contractual price, the contractor lost money. Conversely, if Grumman's actual cost was lower than the contractual price, a profit was made. Grumman was motivated to contain cost growth within the program to obtain greater profit.

The Department of the Navy, as the major advocate for the F-14D, saw the aircraft as a low cost, high performance replacement for the F-14A in the outer air battle. As such, the acquisition program was designed to manage the key parameters of cost, schedule, and performance. Program cost during full-scale development, for example, were capped by the Secretary of the Navy. Cost reduction strategies such as the use of fixed-price type contracts, commonality, and preplanned product improvement were also used to limit cost growth. Schedule risk was managed by the judicious use of concurrency during certain key phases of development and testing. Performance risk was reduced by the wide use of proven technology from the Air Force and other Navy programs.

H. THE F-14D IS PRESENTED TO CONGRESS

Armed with a validated mission need and approval for the F-14D aircraft's development from the Office of the Secretary of Defense, the Navy requested large scale increases in RDT&E funding from Congress for Fiscal Year 1985 (FY 85).

In devising its strategy to market the F-14D to Congress, the Navy had anticipated congressional concerns to focus on the affordability aspects of the program. Instead, deliberations in both the House of Representatives and Senate focused not on the affordability of the program, but on the improved safety aspects of the program and competition.

In the House Appropriations Committee, Representatives Young of Florida and Addabbo of New York set the tone for deliberations on the F-14D program by focusing on the TF-30 engine.

> Mr.YOUNG. I am wondering why we don't write the engines [TF-30] off as a bad deal, sell them to somebody or scrap them, and take out the parts or put new engines in a good airplane to make the airplane reliable...when you think about losing the life of the crew, and it is a two-man crew in this airplane, I don't know, sometimes you have to take your losses and you cut and run. You [Admiral Schoultz] have confirmed the fears about the TF-30 engine that I have heard from some of your people that fly them. [Ref. 19:p. 347]

Likewise, in the Senate Armed Services Committee, the F-14D program found an advocate in Senator John Warner, the former Secretary of the Navy. Senator Warner not only highlighted the performance improvements of the F-14D engine

over its TF-30 predecessor during testimony, but advocated accelerating this portion of the upgrade program.

> Senator WARNER. You have to wait until 1987 [to upgrade the engine]?
>
> Admiral SCHOULTZ. To put them in the airplane. Hopefully they will start buying them before that. The problem is trying to get everything underneath the tent money wise. We hope to have a balanced program.
>
> Senator WARNER. I would like to have the Secretary of the Navy provide me with a program for upgrading that airplane in a period shorter than 1987. If it is fiscal considerations, then we can address those here in the Congress. If it is conditional funding for R&D, likewise we can address that here in Congress. From my own point of view, I think it is unacceptable to have a program that was initiated back in the early seventies and still be not fulfilled here in the eighties. [Ref. 20:p. 2066]

In the Senate Defense Subcommittee on Appropriations, deliberations on the F-14D was dominated by discussion on competition, a topic which had recently been hotly debated in Congress and the acquisition community. Senator Ted Stevens, Chairman of the committee, openly questioned the Navy's methodology for selecting the F-110 engine:

> Senator Stevens. The Air Force is still buying F-100s. They have not told us that they are going to stop buying F-100s. You have just selected the F-110 without any kind of competition for your use.
>
> Admiral Schoultz. Yes, sir. We had an option to go either one, and this one fits into that aircraft very well, and does all of the things we need to do....
>
> Senator Stevens. The Air Force has been touting very heavily to us the cost savings that have come about from their competition. Your numbers were not included in their competition. Why didn't you compete?

> Admiral Busey. There were options in the Air Force competition for Navy aircraft...The Secretary's guidance to us a year ago was that we will select an engine from the Air Force competition. Therefore, the competition knew all along that the Navy was going to make a selection, and that we would not run our own competition. [Ref. 21:pp. 196-197]

Questions submitted by advocates of the F-14D such as Senator D'Amato of New York, tried to defuse the competition issue.

> Question. Please describe the provision(s) of the Air Force's request for proposal for its engine competition which put the competitors on notice that the Navy would be making its engine selection on the basis of the Air Force's competition.
>
> Answer. The USAF request for proposals did address Navy production quality options. Both the General Electric and the Pratt & Whitney proposals included acknowledgement of the RFP line item and provided not-to-exceed (NTE) priced options for the Navy engines.
>
> Question. Did the Navy receive any protests or comments concerning its decision to base its engine selection on the Air Force progress?
>
> Answer. The Navy received no formal protests nor substantive comments on its decision to base its engine selection on the Air Force competition. There was certainly full awareness of the Navy's intention to do so, based on wide circulation of the contents of the Secretary of the Navy's Memorandum dated 6 July 1983. [Ref. 21:pp. 262-263]

Congressional testimony and debate on the F-14D tended to skirt the issues of affordability during its first major discussion before Congress. Congressional advocates for the F-14D attempted to sell the safety merits of the program to their colleagues. In doing so, they hoped to equate support

for the F-14D program with support for operational safety within the military. Other members of Congress, such as Senator Stevens openly questioned specific aspects of the program such as competition. In the end, the F-14D program received the full amount of funds requested; it had passed its first major hurdle.

I. GRAMM-RUDMAN-HOLLINGS

When President Reagan entered office in 1981, he targeted a balanced budget as a key objective of his administration. Speaking on this subject, in his first inaugural address, Reagan stated:

> For decades we have piled deficit upon deficit, mortgaging our future and our children's future for the temporary convenience of the present. To continue this long trend is to guarantee tremendous social, cultural, political and economic upheavals...It is time to...get government back within its means, and to lighten our punitive tax burden. And these will be our first priorities, and on these principles, there will be no compromise. [Ref. 22:p. 72]

By 1985, however, the federal deficit had nearly tripled in amount and doubled as a percentage of Gross National Product [Ref. 22:p. 5]. In a bid to reduce the budget deficit and federal outlays, the Gramm-Rudman-Hollings(GRH) Act of 1985 was passed. The GRH Act prescribed a series of annual deficit reductions, culminating in a balanced budget by Fiscal Year 1991. To enforce its deficit reduction policy, the GRH Act established a sequestration process by which congressional

appropriations could be superseded by automatic cutbacks if deficit targets were not met.

The GRH Act threw not just the F-14D, but the entire future of Naval aviation into doubt.

> Senator Sasser. ...By the final year of Gramm-Rudman, in 1991, I see the Navy plans to increase the number of aircraft procured by 55 percent. Now how does the Navy realistically expect to achieve that goal in view of the budget trends of fewer dollars for defense?
>
> Admiral Martin. We are looking at trying to maintain, within the fiscal constraints that we have, a balanced and affordable program. Our budget that we are lying out for the 5-year defense plan is one that we think is achievable and is executable within the fiscal constraints that we have. But it is going to take a lot of moving and very careful management of our resources. [Ref. 23:p. 206]

Even though the Gramm-Rudmann-Hollings Act would later be overturned by the Supreme Court, the budgetary debates that followed GRH enactment started a trend in reduced defense spending, the impact which would be felt throughout the defense community.

J. PROGRAM RESTRUCTURING

The original acquisition strategy for the F-14D weapon system called for the production of 304 new aircraft. The changing fiscal climate caused by the Gramm-Rudmann-Hollings legislation; however, forced the Secretary of the Navy to revisit the original F-14D production objectives. On 17 September 1986, Lehman directed that procurement of new-production F-14Ds would be supplemented with the remanufacture

of F-14As into F-14Ds [Ref. 24:p. 13]. This change, he hoped, would not only speed the introduction of the F-14D into the fleet but also ease fiscal problems exacerbated by decreased funding within the Future Years Defense Plan (FYDP).

On 25 November 1986, A Program Change Approval Document was signed changing the total quantity of F-14D aircraft to be procured from 304 to 527 [Ref. 17:p. 4]. To execute Lehman's guidance in the most effective manner, the Navy cut its purchase of 304 new Grumman F-14Ds to a buy of 127 [Ref. 17:p. 4]. The Navy's new procurement schedule called for the purchase of seven F-14Ds in Fiscal Year 1988 and then annual procurement of 12 aircraft through 1998 [Ref. 25:p. 18]. The Navy's request for 12 new F-14Ds per year was based on the need to offset projected attrition of fleet aircraft and to maintain a minimum economic production rate at Grumman's Long Island, N.Y. facilities [Ref. 25:p. 18].

The Navy also planned to remanufacture 400 F-14As into the F-14D configuration beginning in 1990. Under the F-14D remanufacturing program, selected F-14A aircraft would be administratively stricken from the Navy's inventory and provided as government furnished material to the contractor. The remanufacture of the F-14A would include rewiring, overhaul, and service-life extension as well as the installation and integration of the new radar, avionics, and engine. The remanufactured F-14D would be identical in

performance and configuration to a new-production aircraft. [Ref. 26:p. 235]

The Navy also viewed the remanufacture program as an opportunity to introduce competition into the F-14D program. This was done not only to lower the overall cost of the program but to address criticism levied by some members of Congress during past deliberations. The acquisition strategy directed that the first lot of six aircraft would be split between Grumman and a second source. Grumman was non-competitively awarded a contract to remanufacture four aircraft with the sole purpose of developing a technical data package. The two remaining aircraft of the first lot would be remanufactured by the second source to validate the data package. To assure a wartime mobilization base, lot 2 would be equally split between Grumman and the second source. The remaining lots were to be competed between Grumman and the second source on a yearly basis. [Ref. 18:pp. 8-9]

The new procurement profile for the F-14D program, which included 127 new production aircraft and 400 remanufactured aircraft represented a 73% increase in the number of F-14Ds available for combat at an estimated 19% increase in cost versus the previous profile of 304 new production aircraft [Ref. 26:p. 235]. Lehman believed the new F-14D aircraft mix obtained the greatest warfighting capability for each year's budget and was the least costly option available for obtaining an all F-14D force.

K. THE CASE AGAINST THE F-14D

By late 1988, opposition to the F-14D program began to emerge in the Office of the Secretary of Defense (OSD). The opposition was led by David Chu, the Assistant Secretary of Defense for Program Analysis and Evaluation (PA&E).

As Assistant Secretary for PA&E, Chu's job was to analyze the relative costs and merits of the major weapon systems purchased by the Department of Defense. The duties of the PA&E office were outlined by one former Assistant Secretary during congressional hearings.

> As the Assistant Secretary of Defense for Program Analysis and Evaluation, my main role would be to advise the Secretary of Defense on issues involving force structure, choices between alternative weapon systems, scenarios on which our planning should be based, the capabilities of alternative forces and what they cost, and similar matters of central importance in defense planning. [Ref. 27:pp. 11-12]

The influence of the PA&E office within the OSD had grown significantly during the budget-conscious years of the late 1980's. As a member of the Defense Planning and Resources Board and the Defense Acquisition Board, the two primary decision-making forums for the OSD, Chu was in a powerful position to influence acquisition decisions. With the defense budget continuing to decrease in terms of real growth, Chu's recommendations to cut waste and eliminate uneconomical programs gathered support.

Chu was opposed to new F-14D production. He believed that in an attempt to keep the Grumman production line open, the Department of Defense was deliberately buying aircraft in low quantities. The effect of this policy was to drive up the unit cost of each aircraft. Chu estimated that the 12 F-14D aircraft scheduled for production in FY 89 would cost the government nearly $75 million each. This cost was three times greater than the $23 million price paid for the Navy's other carrier-based fighter, the F/A-18 Hornet. [Ref. 7:p. 4]

Chu favored the continued remanufacturing of F-14 aircraft as a cost-effective means to upgrade the fighter fleet. Remanufacturing, he believed, invested scarce dollars into areas of the F-14 which needed the most improvement: engines, radar, and avionics. With the Navy scheduled to receive an aircraft-carrier version of the Air Force's Advanced Tactical Fighter (NATF) by the year 2000, Chu also cautioned against procuring airframe life that would not be used. A newly built F-14D with an estimated 25-30 year lifespan, would be replaced by the NATF long before its airframe fatigue life had expired. A remanufactured F-14D with an expected 10-15 year lifespan; however, would phase out nicely with the arrival of NATF. [Ref. 7:p. 26]

His argument against new F-14D production was further bolstered by the Navy's own "Naval Aviation Requirements" report released in early January 1989. The report recommended that the mix of aircraft assigned to aircraft carriers be

changed, with fewer F-14s on each. More significantly, the report said the F-14 was the only aircraft in surplus, an assertion that gave Chu more ammunition to attack the program. [Ref. 7:pp. 26-27]

On 9 January 1989, just prior to leaving office, President Reagan submitted his FY 90 budget to Congress. Included in his request was $1.3 Billion for 12 new F-14Ds and six remanufactured F-14As [Ref. 7:p. 36]. After Bush succeeded Reagan later that month, he announced deep spending cuts and requested agencies to resubmit their FY 90 budgets. For the Department of Defense, this meant a $10 billion budget reduction.

For Chu, the budget resubmission offered a golden opportunity to kill new F-14D production. He found an ally in the Under Secretary of Defense for Acquisition and Technology (USD(A&T)), John Costello, who had also targeted low-volume purchases for termination. On 10 April 1989, the Defense Resources Board decided to kill new F-14D production. Two weeks later, the Secretary of Defense, Richard Cheney, announced the termination decision in testimony before the House Armed Services Committee.

L. THE BATTLE ON CAPITOL HILL

Debate on the fate of the F-14D program now shifted to the Defense Committees of both the House and Senate. Advocates of the program, led by the New York congressional delegation,

attacked the SECDEF's termination decision not from an affordability viewpoint, but one of national security. Several Congressmen argued that the decision to terminate new F-14D production essentially eliminated Grumman as an airframe manufacture. This, they claimed, had dire consequences for both the industrial base and the future of naval aviation competition.

> Senator D'Amato. If we eliminate the F-14D, what about *compe*titiveness in the future as it relates to the naval needs? Are we not going to have just one source?...Mr. Chairman, I think what we are talking about is the destruction of an industrial base called Grumman that provides competitiveness at this time. This is just not a situation where we are cutting back on a plane that is not necessary; we are talking about a plane that is absolutely necessary...If the F-14D is eliminated, Grumman will no longer be able to compete as an effective force in air production. [Ref. 28:pp. 391-392]

> Senator Sasser. I just want to frankly say Senator D'Amato's statement about jeopardizing the future industrial base for Navy fighter production is persuasive to me. I fear that we are going down the path of the Navy relying on one manufacturer to meet Navy fighter needs. It has been my experience just watching the budget figures that when we start relying on solely one manufacturer the taxpayers end up paying a substantial premium for what they receive. [Ref. 28:p. 812]

Secretary Cheney, in explaining his reasoning behind the termination decision, attempted to counter these assertions.

> The greater our surge capability , the greater our ability in peacetime to have competition between competing systems - all of those things are to be valued. The problem, of course, is how much are you willing to pay for that. If you look at the F-14D decision...the new production line was operating at a rate of one a month, and the cost, ran somewhere between $51 million and $75 million per copy, to buy 12 F-14Ds a year. This is a very high price to keep a production line open. Given there

> are other contractors that are out there in the business...we are indeed in a position to know that we will have the industrial base we need to meet our needs in the years ahead. [Ref. 28:pp. 44-45]

Several Congressmen also challenged OSD's assertion concerning F-14 fighter excess. Data were presented by Senator D'Amato of New York which showed shortages in naval fighter forces beginning in the 1996-97 timeframe, if new F-14D production was cut. By the year 2007, the discrepancy was expected to reach 21 percent. With a three year slippage in NATF deliveries, the shortfall would increase to 53 percent. Senator D'Amato argued that the NATF was still in the conceptual phase and that experience had shown joint Navy-Air Force aircraft developments to be disastrous. Should NATF flounder, the Navy would be left without a modern air superiority aircraft for fleet air defense. This scenario, he viewed, was an unacceptable risk to national security.

M. THE SEARCH FOR COMPROMISE

After deliberations ended on the amended Fiscal 1990 Defense Authorization Bill, the Senate Armed Services Committee (SASC) and House Armed Services Committee (HASC) took different directions on the F-14D issue. The SASC sided with the SECDEF and did not authorize funds for new F-14D production. The HASC, however, restored funding to the program. In resurrecting the F-14D, the committee expressed concern that termination of production "may be hastily

conceived and premature". The committee recommended procurement of 12 new F-14Ds in FY 90 and provided advanced procurement for 12 new production aircraft the following year. [Ref. 29:p. 19]

The move to restore funds to the F-14D program by the HASC was a serious rebuke of the Secretary of Defense. Responding to the committee's decision to restore funds for the F-14D, Cheney called the restoration "short-sighted". He believed the decision to keep the F-14D line open would cost $1 billion more than the recommended plan to remanufacture old aircraft and would also result in 30% fewer F-14Ds in the Navy's inventory. [Ref. 30:p. 15]

During joint conference between the House and Senate, a political compromise was reached. The Congress authorized another year's production of new F-14Ds (18 each) on the condition that Grumman sign an agreement stating that it would not seek further production of new F-14Ds [Ref. 31:p. 30]. This agreement, when signed by Grumman, would effectively end new F-14D production at 37 aircraft.

N. THE TERMINATION OF THE F-14D

By 1991, the demise of the Soviet Union as a superpower had forced wholesale changes in the way the Navy viewed warfare. Testifying before Congress, the Secretary of the Navy expressed the Service's vision on modernization and force structure.

> The key that makes maintaining force structure and modernization simultaneously possible is an important shift in the character of the threat we are facing. Most significantly, for our purposes, the long range air defense threat, posed by ASM carrying Backfires, Bears and Badgers is diminished primarily because the likelihood of a major confrontation with the Soviets has decreased. At the same time, the full integration of AEGIS into the fleet's air defense capabilities has improved our overall air defense posture. Unfortunately, we saw no similar change in the nature of the threat as it relates to strike warfare requirements. In fact, the opposite is true. The number of sophisticated IADS [Integrated Air Defense Systems] and associated weapons in the third world are growing. The analysis led us to conclude that we could afford to put less effort into AAW [Air-to-Air Warfare] and modernize plans in the strike warfare area. [Ref. 32:p. 509]

On 26 February 1991, Secretary of Defense Cheney terminated the Grumman F-14D remanufacturing program for the convenience of the government. The Navy also ordered General Electric to end production of 24 F-110 engines and spares for previously designated aircraft conversion. A cancellation notice also went out to Hughes which supplied the AN/APG-71 radar for the F-14D model. [Ref. 33:p. 71]

The main reason all production on the F-14D was ordered terminated was revealed a few days later when DoD announced that it wanted the Navy to develop and buy new versions of the F/A-18, the F/A-18 E/F. The decision to procure the F/A-18 E/F was questioned by many within the Navy and was openly criticized by former Secretary of the Navy Lehman who viewed the F/A-18 as not having the range and payload required to perform the deep strike mission or to provide extended range fleet air defense. F/A-18 proponents countered these

criticisms by highlighting the Hornet's superior reliability, maintainability, survivability, and foreign military sales potential compared to the F-14. The Navy's decision to go with the F/A-18 E/F aircraft vice the F-14D was economically driven by OSD's decision to cut aircraft funding by nearly half in the Future Years Defense Plan (FYDP). The procurement of the F/A-18 E/F would allow the Navy to maintain its projected force structure during future downsizing. [Ref. 34:p. 25]

In April of 1991, Grumman offered the Department of Defense long term price guarantees on the F-14D and F-14 derivatives in an attempt to get the aircraft into the FY 92 Budget. In a letter to Cheney, the Grumman Aerospace Corporation Chairman, Renso Corporali, attempted to competitively price the F-14 against the F/A-18 E/F. He also committed Grumman to broad development of the F-14D Quick Strike, an F-14D derivative with added air-to-ground attack capabilities. Corporali's offer was seen as a last ditch effort on the part of Grumman to reopen the partially closed F-14 production line. [Ref. 35:p. 24]

Although the proposal sounded promising, Navy officials questioned whether Grumman would be able to hold to its stated rates and prices. In the end, the proposal was rejected by DoD. This effectively signalled the end of Grumman's F-14D program.

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APPENDIX B

1. The Department of the Navy, OSD, and Congress are three major participants in the defense acquisition process. In macro terms, how would you describe the functional relationship between these factions? How does this relationship affect the acquisition process from the Navy's perspective?

The Navy is both the initiator and executor of acquisition programs. This characterization yields a measure of autonomy, but the Navy still must seek assistance from other acquisition participants to bring its acquisition strategy to fruition. From the OSD, it receives formal approval of budgets and integration of its budget request into the administration's military, economic, and policy goals. From Congress, The Navy receives broad political support and continued funding. The Service, therefore, must define, defend, and execute acquisition programs in such a manner that it achieves the desired outcomes of all parties.

2. What is the major difference between a fixed-price and cost-reimbursement type contract? How did the Navy justify using a fixed price contract with Grumman during full-scale development considering the risks involved?

The major distinction between fixed-price and cost-reimbursement type contracts is in the industry's obligation and risk. Fixed-price contracts place the greatest obligation and the most risk upon industry to deliver a product at an agreed price. Cost-reimbursement type contracts place the

obligation upon the government. Factors to consider before deciding on the type of contract to pursue include the nature of the technology, the government resources committed to monitor and control the contractor, and the predicted accuracy of the government's cost estimate.

3. What is concurrency? What is the objective and risk of using this type of acquisition strategy?

Concurrency is a scheduling strategy which combines or overlaps design, testing, production, and deployment activities. Its principal objective is to shorten the overall delivery schedule so that the user can obtain an earlier operational capability. Use of concurrency by the Program Manager as part of his acquisition strategy increases program risk. If the technology is advanced and the system is complex; cost growth, schedule slippage, and performance shortfalls are likely to occur if difficulties arise during production. Since concurrency does entail a substantial risk, the Program Manager must evaluate the trade-off of earlier capability with the potential cost, schedule, and performance difficulties which could occur.

4. What acquisition strategies were used by the Program Manager to alleviate cost, schedule, and technical risk?

Cost reduction strategies such as the use of fixed-price type contracts, commonality, and preplanned product improvement were used to limit cost growth. Schedule risk was

managed by the judicious use of concurrency during certain key phases of development and testing. Performance risk was reduced by the wide use of proven technology from the Air Force and other Navy programs.

5. The Navy was criticized in Congress for its lack of competition while procuring the GE-F110 engine. What benefits can be gained from competition?

Advantages of competition include: obtaining a lower price for a product, obtaining a higher-quality product, expanding the industrial base, stimulating research and development, and encouraging cost-conscious behavior. Risks were considered minimal because proven subsystem technology was used and there was sufficient cost history for both parties to project cost with reasonable certainty.

6. How does Congress exert control over DoD? What role does budgeting play?

The Constitution of the United States gives Congress the power to allocate the resources of the Federal Government. This power gives Congress the authority to enact as well as oversee budget execution. Congress exercises control over DoD through statutory controls written into the authorization and appropriation acts and non-statutory controls such as committee reports, testimony, hearings, and oversight. Budgeting is a political process used by the government to formulate policy, establish and pursue national objectives,

promote favorable economic conditions, and respond to the demand of citizens and groups.

7. In 1989, Secretary Cheney attempted to stop new F-14D production. What were the arguments for and against halting this phase of the upgrade?

OSD was opposed to new F-14D production for several reasons. **Arguments against the purchase included:**

(a) DoD was purchasing low quantities of the aircraft which significantly drove up unit cost.

(b) Remanufacturing was a better alternative because it invested scarce dollars into areas of the F-14 which needed the most improvement.

(c) With the Navy scheduled to receive an aircraft-carrier version of the Air Force's Advanced Tactical Fighter (NATF) by the year 2000, the Navy would procure airframe life that would not be used.

(d) There was an excess of F-14 fighters in the fleet. None was needed.

Arguments for the purchase included:

(a) Termination of new F-14D production essentially eliminated Grumman as an airframe manufacturer.

(b) Future competitiveness in the naval aircraft industry would suffer if Grumman was eliminated as a manufacturer.

(c) An inadequate industrial base would exist if Grumman went out of business.

(d) There was only a short term excess of F-14 fighters in the fleet. If new F-14D production was cut, there would be severe shortages in naval fighter forces.

8. Critics of Secretary Cheney's decision to halt new F-14D production questioned his lack of expertise in defense matters and his dependence on the PA&E office. How does the appointee system at DoD contribute to instability in the decision-making process?

The appointee system is seen as contributing significantly to instability in the decision-making and administrative process. Some appointees lack the expertise and experience to handle the complexity of weapon systems acquisition. Many disrupt activities while they learn something about their jobs and are prone to act from authority rather than knowledge.

9. Based on this case study, do you feel there is a clear distinction between policy formulation and implementation?

Policy implementation is usually not cleanly separated from policy formulation. The sharp dividing line is not present because Congress requires annual review of previously approved authorizations and appropriations. Most programs are revisited every year in briefings and testimony to legislators and staff. Few decisions to proceed with program development are final.

10. Should a Program Manager be an advocate for his program? Does the current acquisition culture support or encourage unbiased reporting by the Program Manager?

The Program Manager is tasked by his charter to maintain a total Service perspective and keep the leadership appraised of program status, to include problems which could affect the Service's commitment to the program. Advocacy for a program becomes a problem when it interferes with this mission and causes unethical behavior by the Program Manager. The current acquisition climate does not encourage unbiased reporting. It is difficult for a Program Manager to evaluate subjectively his program when program success is often equated with career success.

11. In 1991, the Navy terminated the remanufacture program for the convenience of the government. What liabilities do the government incur through this action?

When a contract is terminated for convenience, the contractor may recover (1) his costs of performance incurred up to the time of termination, (2) certain "continuing costs," (3) his settlement expenses, and (4) for fixed-price contracts, an allowance for profit (unless the contract would have been performed at loss). Overall, the guiding principle for a contractor's recovery in a termination settlement is that the contractor be fairly compensated for the work done and preparations made for the terminated portions of the contract.

12. What is the role and objective of PPBS?

The PPBS is a decision-making process for allocating resources among a number of competing programs or alternatives which support national strategy. The ultimate objective of PPBS is to provide operational commanders with the best mix of forces, equipment, and support attainable within fiscal constraints. To achieve this objective, PPBS is split into three distinct but interrelated phases: planning, programming, and budgeting.

13. What is the trade-off between weapon systems affordability and rate of production?

Economic production rates contribute to stability and savings by allowing a contractor to take advantage of tooling and plant capacity to produce additional units of a system at a cheaper unit cost. This allows "economies of scale" to occur. Weapon systems produced in low quantities do not benefit from this advantage.

14. What role does the DAB play in the acquisition decision-making process?

The Defense Acquisition Board (DAB) is the primary forum of decision-making within the Department of Defense (DoD) for acquisition programs. The DAB conducts management of major defense acquisition programs (ACAT I) as they proceed from

requirement and concept definition through production and deployment.

Formal DAB reviews are conducted at each milestone to assess program accomplishments during the previous life-cycle phase and to assess readiness to proceed to the next phase. Typical issues addressed in DAB proceedings include, "cost growth, schedule delays, technical threshold breaches, supportability issues, acquisition strategy, threat assessment, test and evaluation highlights, cooperative development/joint service concerns, manpower evaluation, and operational effectiveness/suitability." At the conclusion of the DAB review, the (USD(A&T)) issues his decisions and guidance through the Acquisition Decision Memorandum.

15. Once the POM completes service review, it is forwarded to the DPRB. What function does the DPRB perform and who are some of its key members?

The DPRB is a high level DoD group that assists the Secretary of Defense in managing the Planning, Programming, and Budgeting System. Key members include: the Under Secretaries of Defense for Acquisition & Technology (USD(A&T)) and Policy (USD(P)), the DoD Comptroller, and the Assistant Secretary of Defense for Program Analysis and Evaluation (ASD (PA&E)). The DPRB's decisions regarding Service programs are submitted to the Secretary of Defense for approval. After the Secretary of Defense makes the final POM decisions, they are recorded in Program Decision Memoranda (PDM). The PDM

approves the POM with specific changes and it becomes the basis for Budget Estimate Submission.

16. What risks do the Government take in providing GFE?

When the decision is made to provide GFE, the Government must manage the acquisition of the item to be furnished and must assume responsibility for on-time delivery, functional performance, quality, reliability and the technical interface of GFE with the end item. Since the Government has full responsibility for GFE, a contractor will be able to recover the extra costs caused by the Government's (a) failure to deliver GFE, (b) delay in delivery of GFE, or (c) furnishing of unsuitable GFE.

17. What do you think motivates congressional members to take a more active role in the oversight of DoD acquisition programs?

The behavior of elected officials is driven by the capacity in which he or she is serving. These capacities are constituency, career, agency, and institution.

Constituent serving behavior is driven by the desire of members to address the political and economic interest of the voters back in there home states and districts. The desire to take care of parochial interest is often seen in the enactment of defense related legislation. The political process of using federal programs to benefit constituents is referred to as "pork barrel" politics.

Career serving behavior is motivated by a member's personal goals, desires, and ambitions. Members of Congress can help their careers by serving their constituents, doing favors for influential people, supporting their political party, and tending the needs of special political interest groups. Favors are normally returned in the form of campaign contributions, access to information, or reelection support. Career serving behavior is one of the most powerful influences on congressional decision-making.

Agency serving behavior is driven by a member's legitimate concern over the efficient and effective functioning of governmental agencies. The welfare of the nation and support of national policy objectives are the top motivator in this category.

Institution serving behavior is similar to agency serving except the member's behavior is motivated by their desire to influence a legislative agenda.

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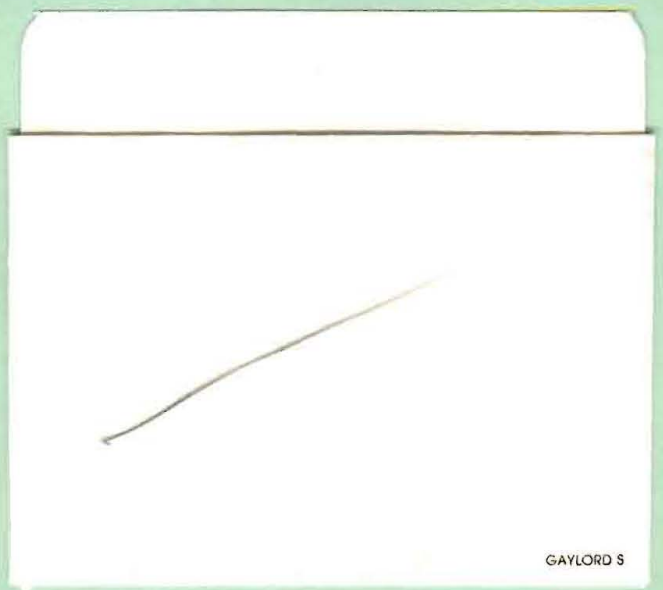

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